UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

BIG RIDGE PARK QUADRANGLE
TENNESSEE
7.5 MINUTE SERIES (TOPOGRAPHIC) 146-NW

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by USC&GS, USGS, WPA, and TVA

Complete field revision by TVA 1952, using aerial photographs taken 1952 and by reference to TVA-USGS quadrangle dated 1941. Original map compiled by multiplex methods from aerial photographs taken 1940

Polyconic projection. 1927 North American datum
10,000-foot grid based on Tennessee rectangular coordinate system
1000-meter Universal Tansverse Mercator grid ticks, zone 17.

To place on the predicted North American Datum 1983 move the projection lines 6 meters south and 7 meters west as shown by dashed corner ticks

UTM GRID AND 1952 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

There may be private inholdings within the boundaries of the National or State reservations shown on this map

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION

HARD-SURFACE ALL WEATHER ROADS — DRY WEATHER ROADS
Heavy-duty — 4 LANE 18 LANE — Improved dirt
Medium-duty — 4 LANE 18 LANE — Unimproved dirt
Loose surface, graded, or narrow hard-surface
U.S. Route — State Route

BIG RIDGE PARK, TENN.
N3607.5 W8352.5/7.5
1952

LANDSLIDES AND RELATED FEATURES

OF THE BIG RIDGE PARK, TENN. QUADRANGLE

by
William F. Outerbridge

1982

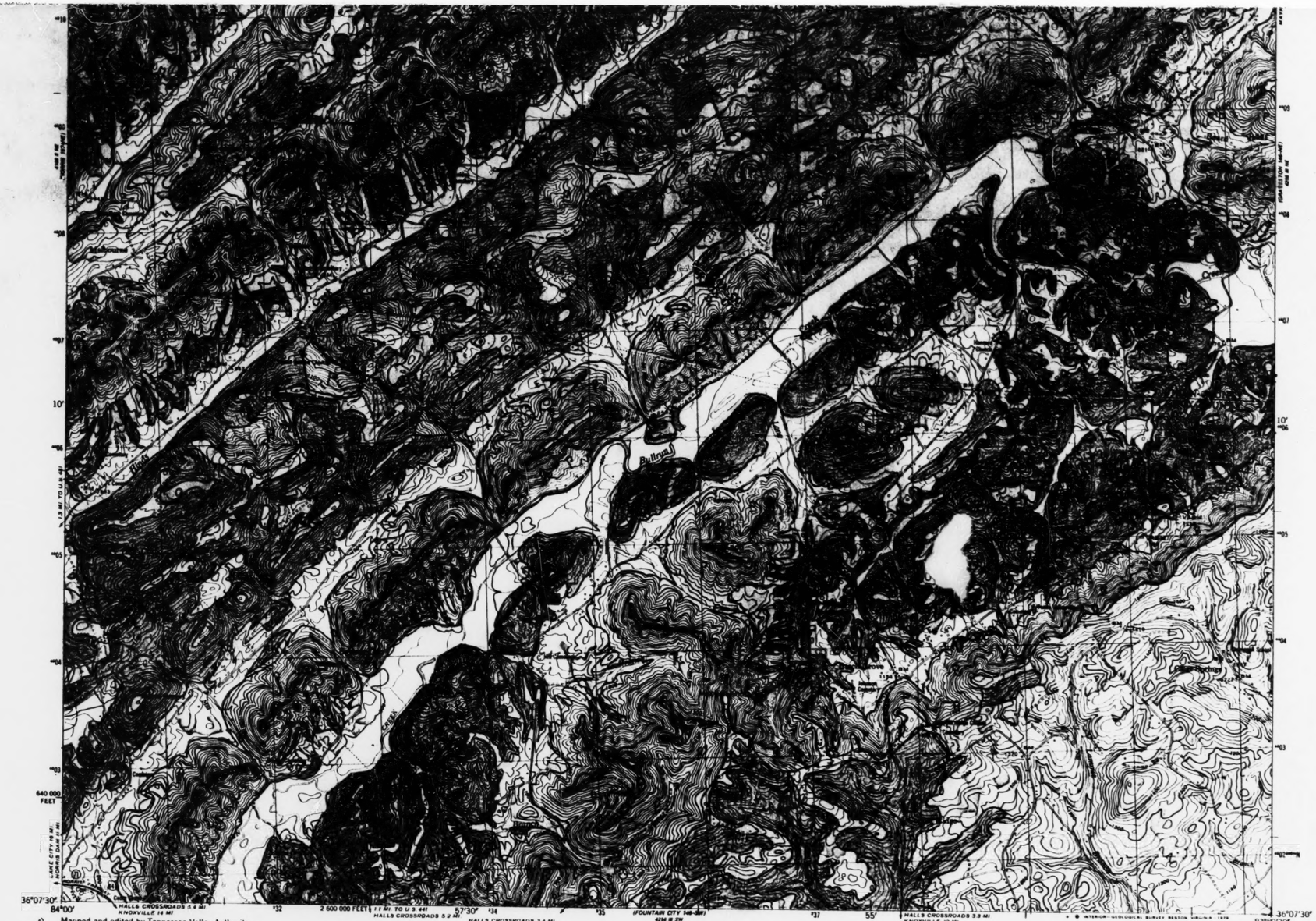
U.S. Geological Survey
OPEN FILE MAP 82-0422 (B-1)

field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

NOTE

Information shown is intended as a general guide to ground conditions as of the date of field check. Additional landslides and rockfalls should be anticipated in all map units. The map unit depicts the dominant condition in the area delineated and variations in slope stability may occur at any point in the unit. This map is suitable for general planning purposes and as a supplement to more detailed studies for site selection. The map cannot be used as a substitute for detailed geologic and engineering investigations to establish design and construction criteria of specific sites. Some symbols may not appear on this map because the description is applicable to a series of maps.



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To place on the predicted North American Datum 1983 move the projection lines 6 meters south and 7 meters west as shown by dashed corner ticks

UTM GRID AND 1952 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

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SCALE 1:24000

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION

HARD SURFACE ALL WEATHER ROADS		DRY WEATHER ROADS	
Heavy duty	4 LANE OR 2 LANE	Improved dirt	
Medium-duty	4 LANE OR 2 LANE	Unimproved dirt	
Loose-surface, graded, or narrow hard-surface			

(U.S.) U. S. Route (State) State Route

BIG RIDGE PARK, TENN.
N3607.5 W8352.5/7.5

1952

field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE BIG RIDGE PARK, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

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ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

P — OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V — COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol a designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

The first six digits of the open file number designate the specific 1:250,000 scale map sheet of which this quadrangle is a part. The last two digits designate the position of the quadrangle in a subdivision of the 1:250,000 scale map based on rows and tiers shown in the diagram to the right. The location of this quadrangle is shown by the black square.

MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)
- sh — bench with high wall
- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

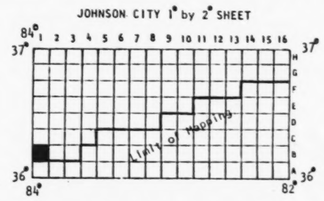
Coal refuse banks
- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries
- q — quarry site
- qub — spoil bank, quarry waste

Gravel pits
- g — site of gravel pit

Slides in man-made features
- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

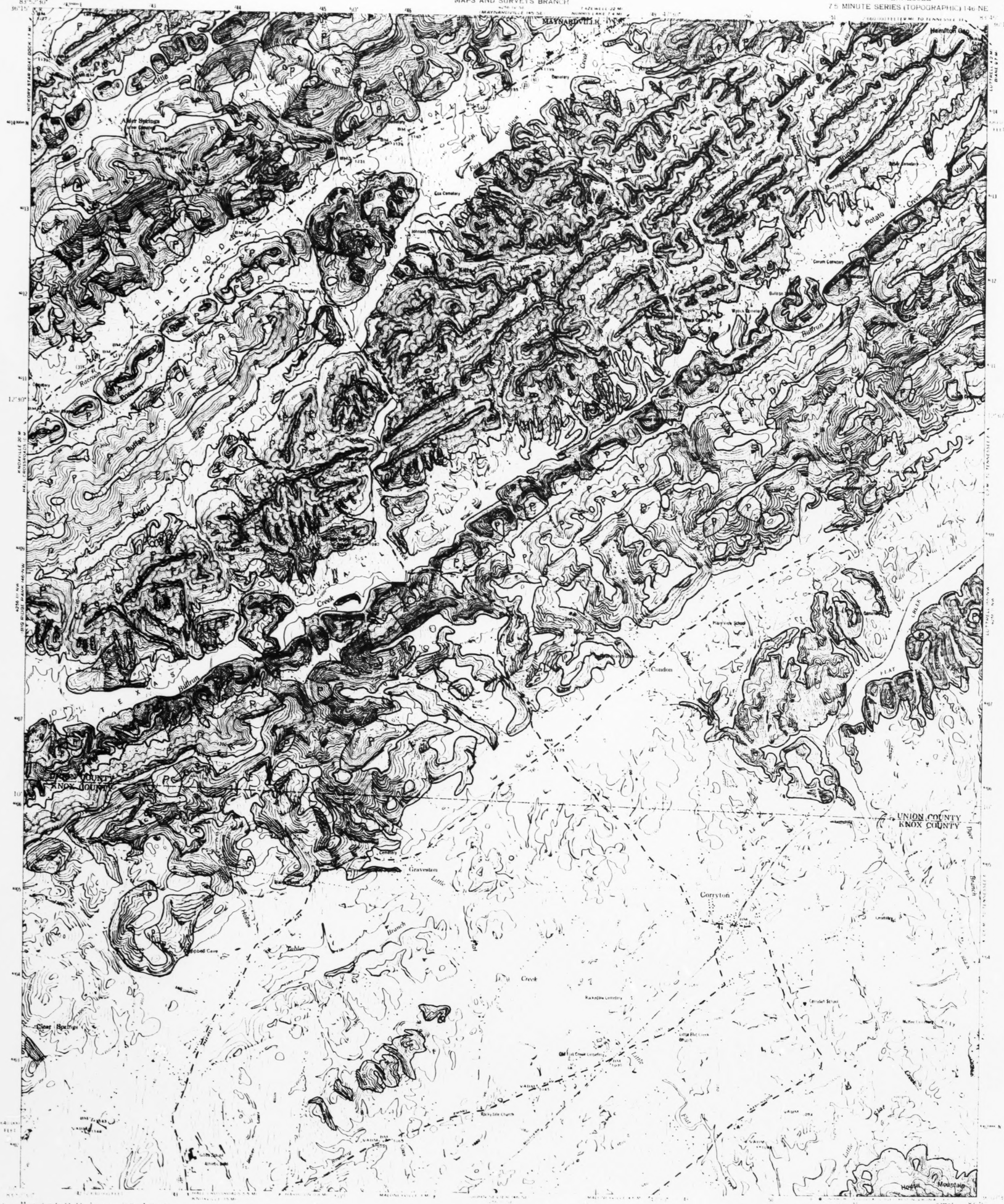
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

GRAVESTON QUADRANGLE
TENNESSEE
7.5 MINUTE SERIES (TOPOGRAPHIC) 146 NE



Mapped, edited, and published by the Tennessee Valley Authority
Published by the Geological Survey

Control by TVA and USC&GS

Topography by TVA and USGS

Aerial photographs taken 1941. Field checked 1980

Projection and 10,000-foot grid ticks: Universal Transverse Mercator, zone 17

1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Medium-duty ——— Light-duty - - - -
Unimproved dirt ..... Trail

GRAVESTON, TENN.
N3607.5-W8345/7.5

1982

LANDSLIDES AND RELATED FEATURES

OF THE GRAVESTON, TENN. QUADRANGLE

by
William E. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (B-2)

field check 1980-1981

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NOTE

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MAN-MADE FEATURES

Mapped and Edited by Tennessee Valley Authority
Published by the Geological Survey

Topography by TVA and USGS
Photogrammetric manuscripts by TVA from aerial photographs taken 1951 and 1952 by the Aerial Surveys Branch, TVA
Field checked 1980-1981

Projection and 10,000-foot grid ticks: North American Datum of 1927 (mean value for conterminous United States)
1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

ROAD CLASSIFICATION
Medium duty — — — Light duty
Unimproved dirt
State Route

GRAVESTON, TENN.
N3607.5-W8345/7.5
1952

LANDSLIDES AND RELATED FEATURES

OF THE GRAVESTON, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (I-B-2)

field check 1980-1981

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ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol ▼ designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

The first six digits of the open file number designate the specific 1:250,000 scale map sheet of which this quadrangle is a part. The last two digits designate the position of the quadrangle in a subdivision of the 1:250,000 scale map based on rows and tiers shown in the diagram to the right. The location of this quadrangle is shown by the black square.

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- sh — bench with high wall
- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

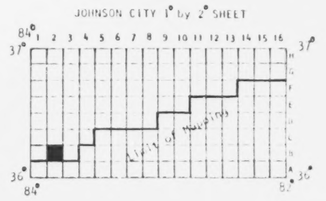
Coal refuse banks
- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries
- q — quarry site
- qsb — spoil bank, quarry waste

Gravel pits
- g — site of gravel pit

Slides in man-made features
- a/f — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

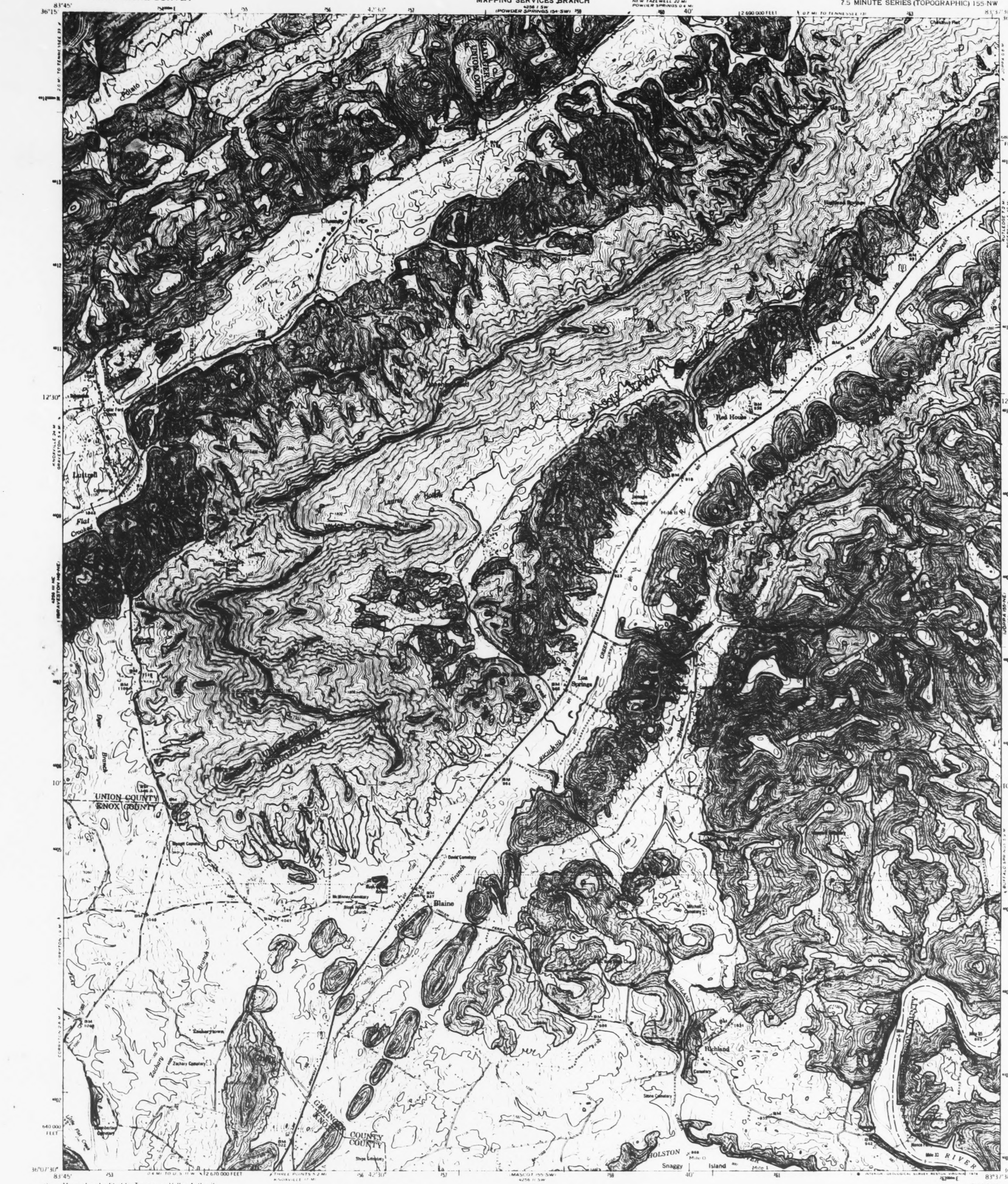
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

LUTTRELL QUADRANGLE
TENNESSEE
7.5 MINUTE SERIES (TOPOGRAPHIC) 155-NW



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Polyconic projection. 1927 North American datum
10,000 foot grid based on Tennessee rectangular coordinate system
1000 metre Universal Transverse Mercator Grid ticks, Zone 17, shown in blue

UTM GRID AND 1976 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION
Heavy duty — Poor motor road
Medium duty — Wagon and jeep track
Light duty — Foot trail
U.S. Route — State Route
In developed areas, only through roads are classified

LUTTRELL, TENN.
N3607.5 W8337.5/7.5
1952
PHOTOREVISED 1976

LANDSLIDES AND RELATED FEATURES

OF THE LUTTRELL, TENN. QUADRANGLE

by
William F. Outerbridge

1982
U.S. Geological Survey
OPEN FILE MAP 82-0422 (B-3)

Field check 1980-1981

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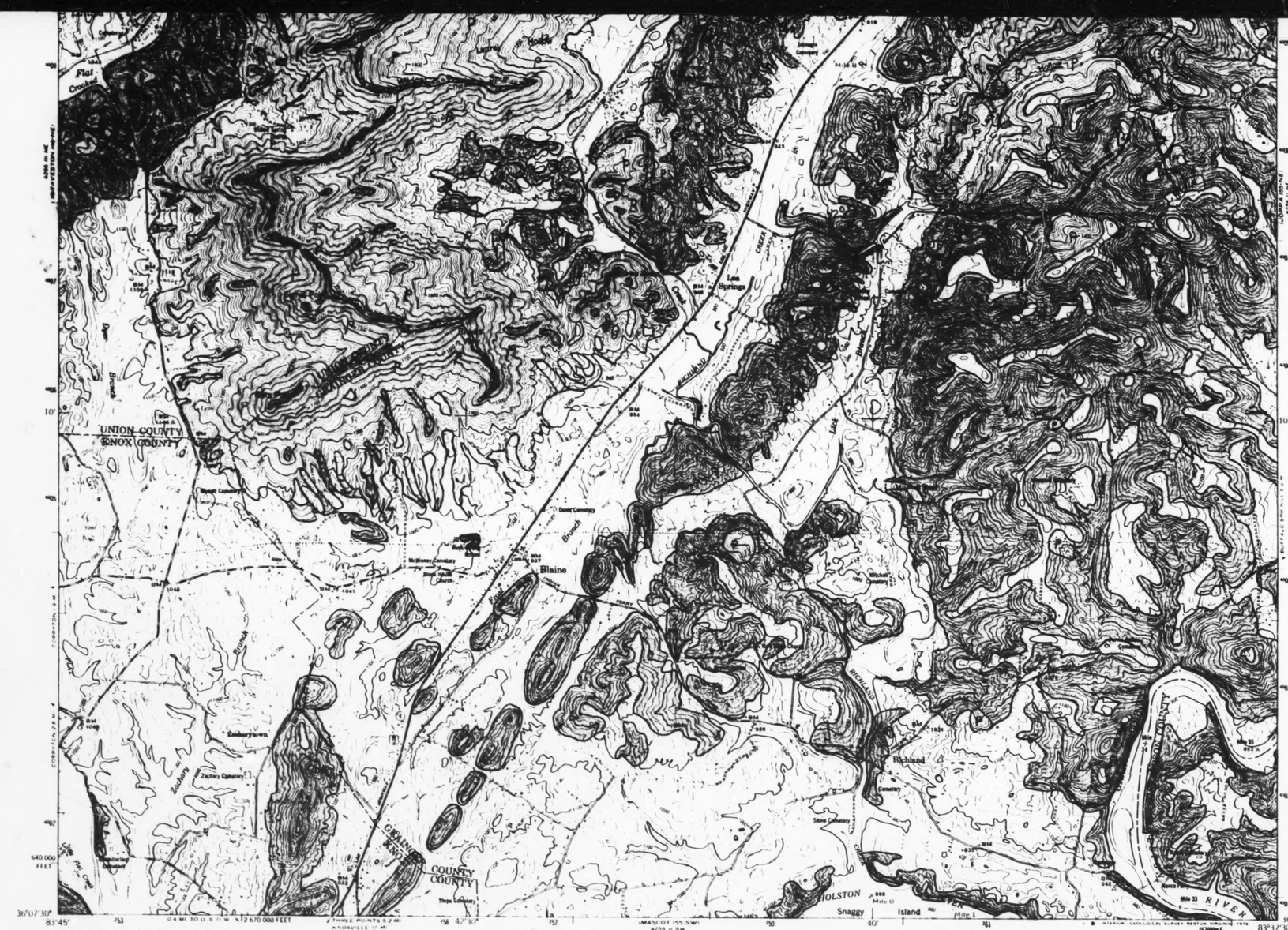

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Polyconic projection. 1927 North American datum
10,000 foot grid based on Tennessee rectangular coordinate system
1000 metre Universal Transverse Mercator Grid ticks, Zone 17, shown in blue

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy duty — Poor motor road
Medium duty — Wagon and jeep track
Light duty — Foot trail
U.S. Route ( ) State Route

In developed areas, only through roads are classified

LUTTRELL, TENN.

N3607.5/W8337.5/7.5

1952

PHOTOREVISED 1976

field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE LUTTRELL, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (B-3)

ACTIVE OR RECENTLY ACTIVE LANDSLIDE

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P — OLD LANDSLIDE

Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

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- r — identified on aerial photographs; not classified in field check
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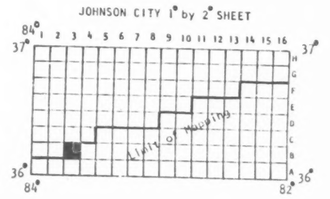
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
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GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

WHITE HOLLOW QUADRANGLE
TENNESSEE
7.5 MINUTE SERIES (TOPOGRAPHIC) 145-SW

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by USC&GS, USGS, and TVA

Complete field revision by TVA 1952, using aerial photographs taken 1952 and by reference to TVA-USGS quadrangle dated 1941. Original map compiled by multiplex methods from aerial photographs taken 1940

Polyconic projection. 1927 North American datum
10,000 foot grid based on Tennessee rectangular coordinate system

——1052—— Indicates Norris Lake Easement Boundary

1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

UTM GRID AND 1952 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

ROAD CLASSIFICATION

HARD SURFACE ALL WEATHER ROADS	DRY WEATHER ROADS
Heavy duty	Improved dirt
Medium-duty	Unimproved dirt
Loose-surface, graded, or narrow hard surface	

U.S. Route State Route

WHITE HOLLOW, TENN.
N3615-W8352 07.5
1952

field check 1980-1981

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LANDSLIDES AND RELATED FEATURES
OF THE WHITE HOLLOW, TENN. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(C-1)

NOTE

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MAN-MADE FEATURES

Strip mines (combination of letter symbols

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Complete field revision by TVA 1952, using aerial photographs taken 1952 and by reference to TVA-USGS quadrangle dated 1941. Original map compiled by multiplex methods from aerial photographs taken 1940

Polyconic projection. 1927 North American datum
10,000 foot grid based on Tennessee rectangular coordinate system

— — 1052 — — Indicates Norris Lake Easement Boundary

1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

UTM GRID AND 1952 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

ROAD CLASSIFICATION

HARD SURFACE ALL WEATHER ROADS	DRY WEATHER ROADS
Heavy-duty	Improved dirt
Medium-duty	Unimproved dirt
Loose-surface, graded, or narrow hard surface	

U. S. Route State Route

WHITE HOLLOW, TENN.

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field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE WHITE HOLLOW, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(C-1)

ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

sh	bench with high wall
sf	furrowed with high wall
sd	multiple furrows and multiple benches
ss	hilltop removed
srg	reclaimed by grading
sru	reclaimed by secondary use
sh/r	regraded in part, high wall remains

Coal refuse banks

r	identified on aerial photographs; not classified in field check
rb	not burnt nor on fire
rbb	burnt
rbd	burning
rbs	sludge

Quarries

q	quarry site
qub	spoil bank, quarry waste

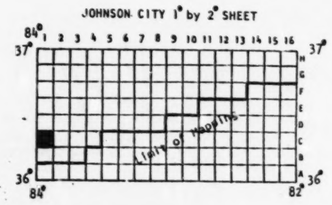
Gravel pits

g	site of gravel pit

Slides in man-made features

af	earth flow in fill
a/s	earth flow in strip castings
a/r	earth flow in coal refuse

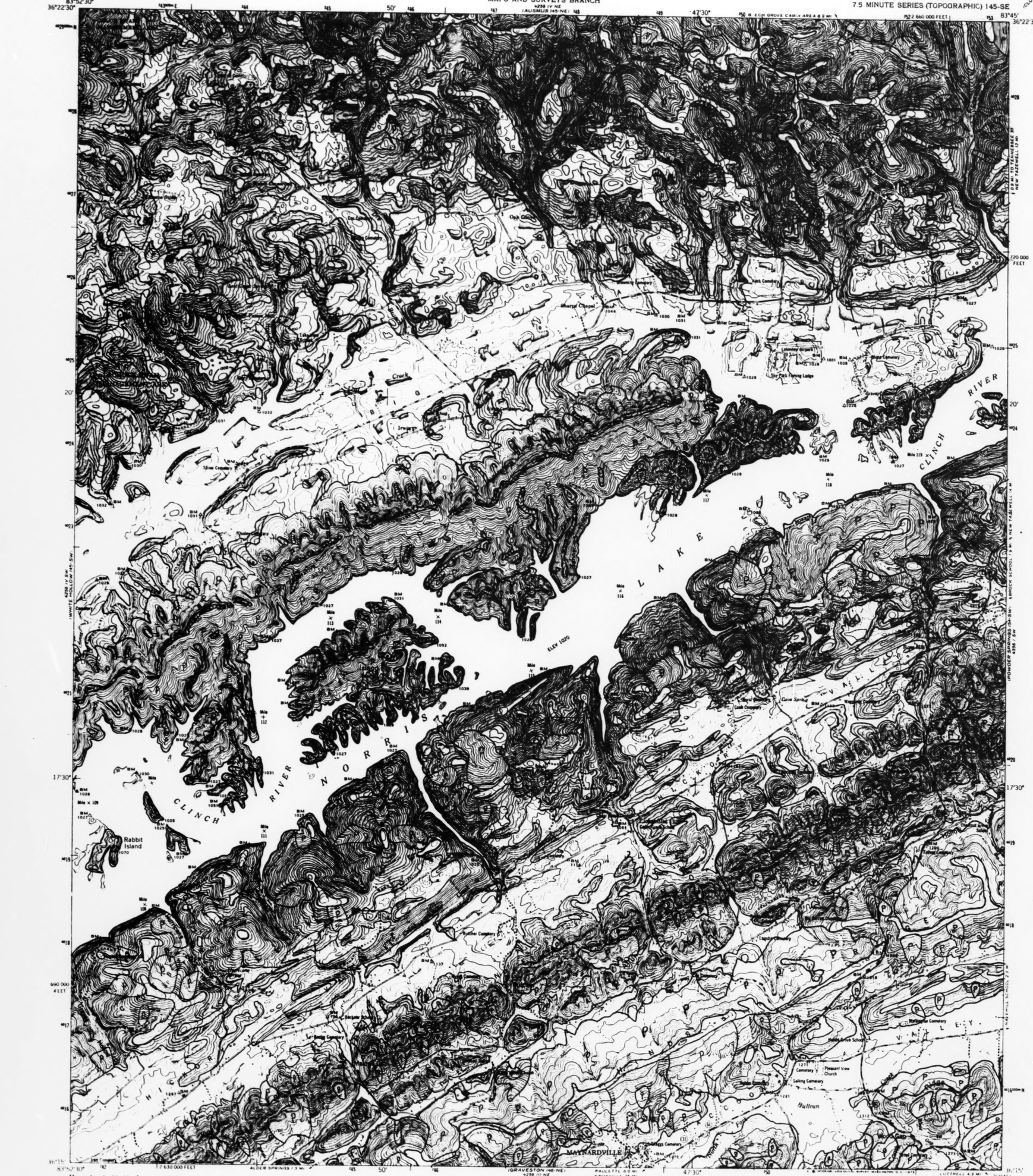
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

MAYNARDVILLE QUADRANGLE
TENNESSEE-UNION CO.
7.5 MINUTE SERIES (TOPOGRAPHIC) 145-SE



Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by USE&GS, USGS, WPA, and TVA

Complete field revision by TVA 1952, using aerial photographs taken 1952 and by reference to TVA USGS quadrangle dated 1941. Original map compiled by multiplex methods from aerial photographs taken 1941.

Polyconic projection. 1927 North American datum
10,000-foot grid based on Tennessee rectangular coordinate system

Interstate, State, County, and Land Grant Boundary

1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DASHED LINES REPRESENT HALF-INTERVAL CONTOURS
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1952 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

ROAD CLASSIFICATION
In developed areas, only through roads are classified.
HARD SURFACE ALL WEATHER ROADS — DRY WEATHER ROADS
Heavy duty — Improved dirt
Medium duty — Unimproved dirt
Loose surface, graded, or narrow hard surface
U.S. Route — State Route

MAYNARDVILLE, TENN.
N3615.W8345/7.5
1952

LANDSLIDES AND RELATED FEATURES

OF THE MAYNARDVILLE, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(C-2)

field check 1980-1981

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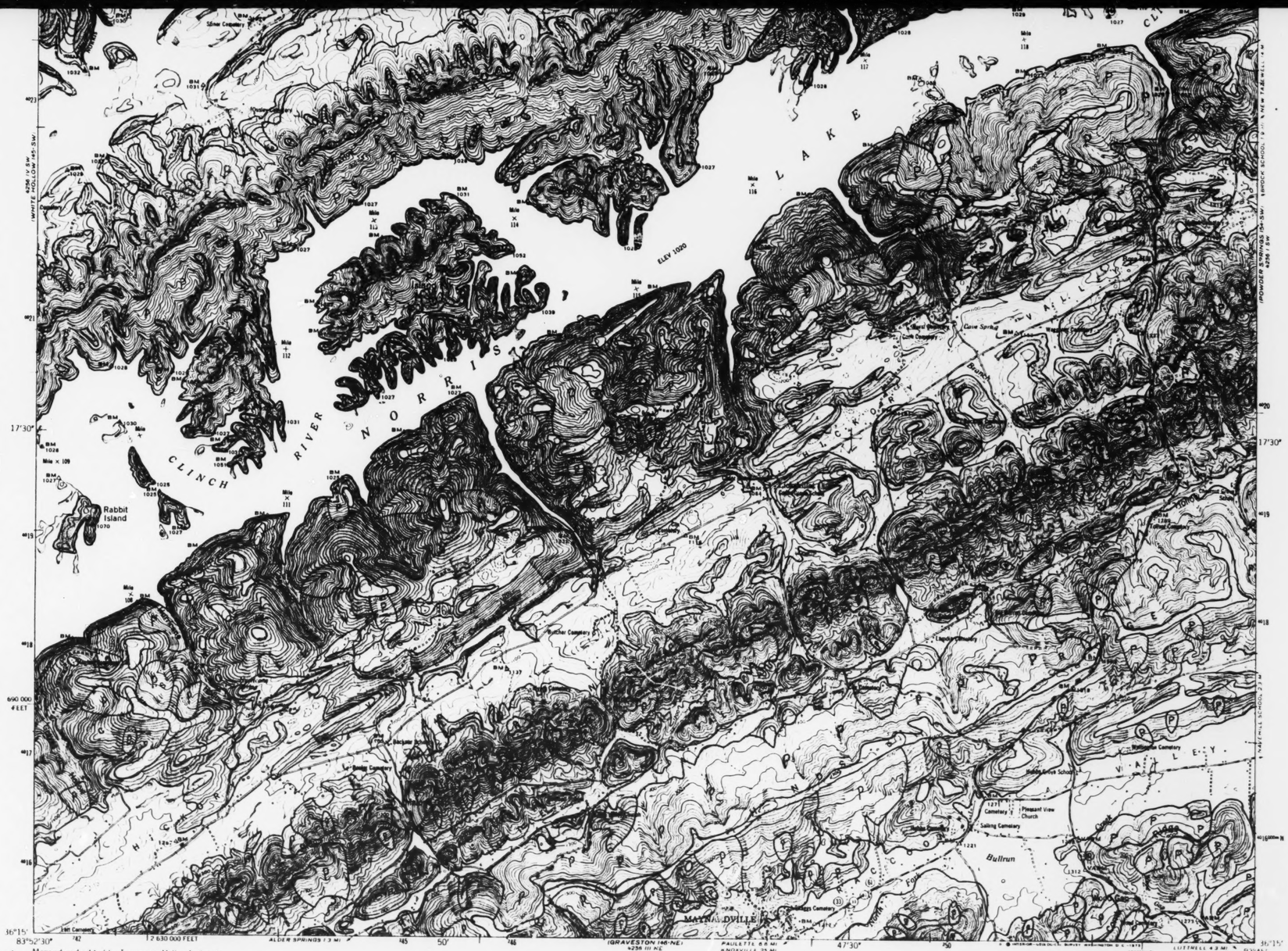

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— — — — Tellico-Norris Lake Easement Boundary

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(8) U. S. Route (88) State Route

MAYNARDVILLE, TENN.
N3615.W8345/7.5

1952

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by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(C-2)

Field check 1980-1981

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- rbb burnt
- rbd burning
- rbs sludge

Quarries
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- qub spoil bank, quarry waste

Gravel pits
- g site of gravel pit

Slides in man-made features
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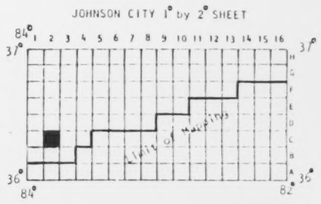

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

POWDER SPRINGS QUADRANGLE
TENNESSEE
7.5 MINUTE SERIES (TOPOGRAPHIC) 154-SW

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by USC&GS, USGS, and TVA

Compiled from aerial photographs taken 1941, and by reference to TVA (USGS) quadrangle dated 1942. Original map compiled by multiplex methods from aerial photographs taken 1940.

Projection and grids: Transverse Mercator projection
1000-foot grid based on Tennessee coordinate system

1000 metre Universal Transverse Mercator grid ticks, zone 17, shown in blue

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

POWDER SPRINGS, TENN.
N3615.W8445/7.5

1952

LANDSLIDES AND RELATED FEATURES

OF THE POWDER SPRINGS, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(C-3)

Field check 1980-1981

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MAN-MADE FEATURES

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Published by the Geological Survey

Control by USC&GS, USGS, and TVA

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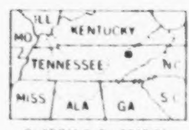
Polyconic projection. 1927 North American datum. 10,000 foot grid based on Tennessee rectangular coordinate system

1000 metre Universal Transverse Mercator grid ticks, zone 17, shown in blue

UTM GRID AND 1952 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



QUADRANGLE LOCATION

ROAD CLASSIFICATION

HARD SURFACE ALL WEATHER ROADS — DRY WEATHER ROADS

Heavy duty — 4 LANE 6 LANE — Improved dirt

Medium duty — 4 LANE 6 LANE — Unimproved dirt

Loose surface, graded, or narrow hard surface

U. S. Route — State Route

POWDER SPRINGS, TENN.
N3615-W8337.5/7.5

1952

LANDSLIDES AND RELATED FEATURES

OF THE POWDER SPRINGS, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(C-3)

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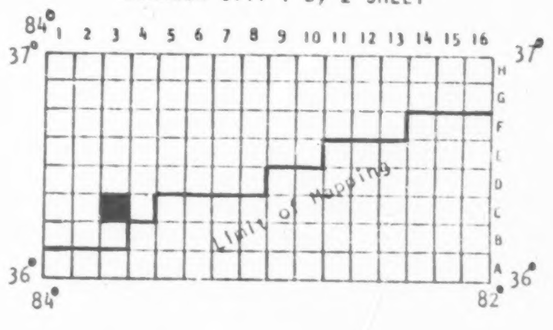

UNITED STATES
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UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

DUTCH VALLEY QUADRANGLE
TENNESSEE
7.5 MINUTE SERIES (TOPOGRAPHIC) 154-SE

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by USC&GS, USGS, and TVA

Topography by USGS by photogrammetric methods
Map field checked by TVA, 1941

Polyconic projection. 1927 North American datum
10,000 foot grid based on Tennessee rectangular coordinate system
1000 meter Universal Transverse Mercator Grid ticks,
Zone 17, shown in blue

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION

Heavy duty	Poor motor road
Medium duty	Wagon and jeep track
Light duty	Foot trail
U. S. Route	State Route

DUTCH VALLEY, TENN.
N3615 W8330/7.5

1941
PHOTOREVISED 1971

field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE DUTCH VALLEY, TENN. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(C-4)

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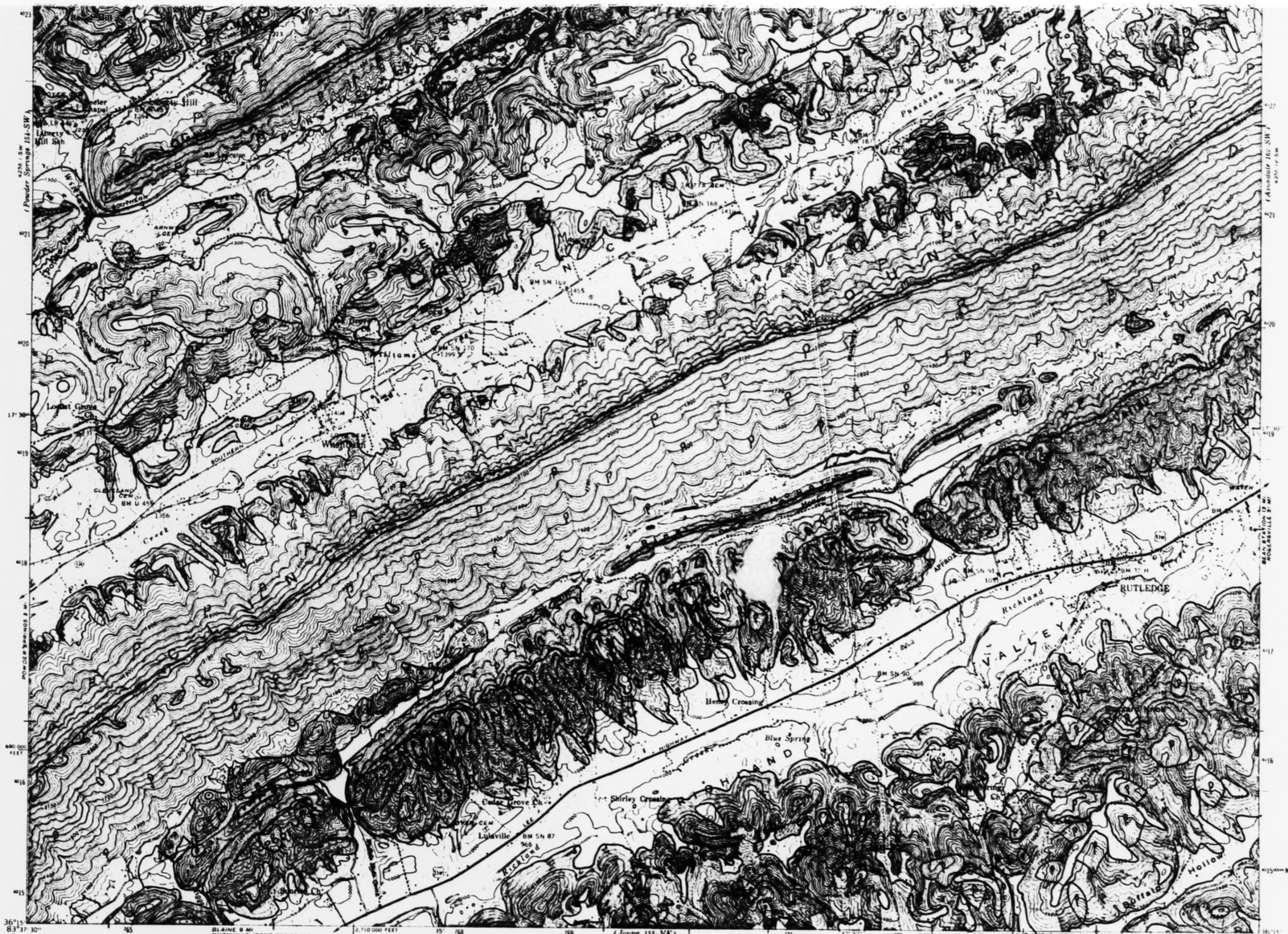

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QUADRANGLE LOCATION

ROAD CLASSIFICATION

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DUTCH VALLEY, TENN.

N3615 W8330/7.5

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r	identified on aerial photographs; not classified in field check
rb	not burnt nor on fire
rbb	burnt
rbd	burning
rbs	sludge

Quarries

q	quarry site
qub	spoil bank, quarry waste

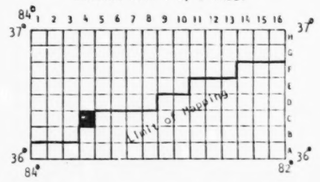
Gravel pits

g	site of gravel pit

Slides in man-made features

af	earth flow in fill
a/s	earth flow in strip castings
a/r	earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

WELL SPRING QUADRANGLE
TENNESSEE
7.5 MINUTE SERIES (TOPOGRAPHIC) 145-NW

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS/NOAA, USGS, and TVA

Revised by TVA in 1952 by photogrammetric methods using aerial photographs taken 1952 and by reference to TVA-USGS quadrangle dated 1942. Map field checked by TVA, 1952

Polyconic projection. 10,000-foot grid ticks based on Tennessee coordinate system. 1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue. 1927 North American Datum To place on the predicted North American Datum 1983 move the projection lines 6 meters south and 8 meters west as shown by dashed corner ticks

There may be private inholdings within the boundaries of the National or State reservations shown on this map

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1980 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

ROAD CLASSIFICATION (TVA 145 NW)

Primary highway, all weather, hard surface — Light-duty road, all weather, improved surface
Secondary highway, all weather, hard surface — Unimproved road, fair or dry weather
Interstate Route — U.S. Route — State Route

WELL SPRING, TENN.
N3622.5 W8352.5/7.5

1552
PHOTOREVISED 1980

field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE WELL SPRING, TENN. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey
OPEN-FILE MAP 82-[illegible]

NOTE

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UTM GRID AND 1980 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION (TVA 145 NW)

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Light-duty road, all weather, improved surface
Secondary highway, all weather, hard surface
Unimproved road, fair or dry weather
Interstate Route U S Route State Route

WELL SPRING, TENN.
N3622.5 W8352.5/7.5

1952
PHOTOREVISED 1980

field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE WELL SPRING, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(D-1)

ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol ⚠ designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

The first six digits of the open file number designate the specific 1:250,000 scale map sheet of which this quadrangle is a part. The last two digits designate the position of the quadrangle in a subdivision of the 1:250,000 scale map based on rows and tiers shown in the diagram to the right. The location of this quadrangle is shown by the black square.

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

- sh bench with high wall
- sf furrowed with high wall
- sd multiple furrows and multiple benches
- ss hilltop removed
- srg reclaimed by grading
- sru reclaimed by secondary use
- sh/r regraded in part, high wall remains

Coal refuse banks

- r identified on aerial photographs; not classified in field check
- rb not burnt nor on fire
- rbb burnt
- rbd burning
- rbs sludge

Quarries

- q quarry site
- qub spoil bank, quarry waste

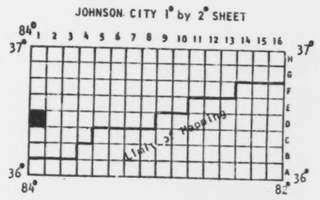
Gravel pits

- g site of gravel pit

Slides in man-made features

- af earth flow in fill
- a/s earth flow in strip castings
- a/r earth flow in coal refuse

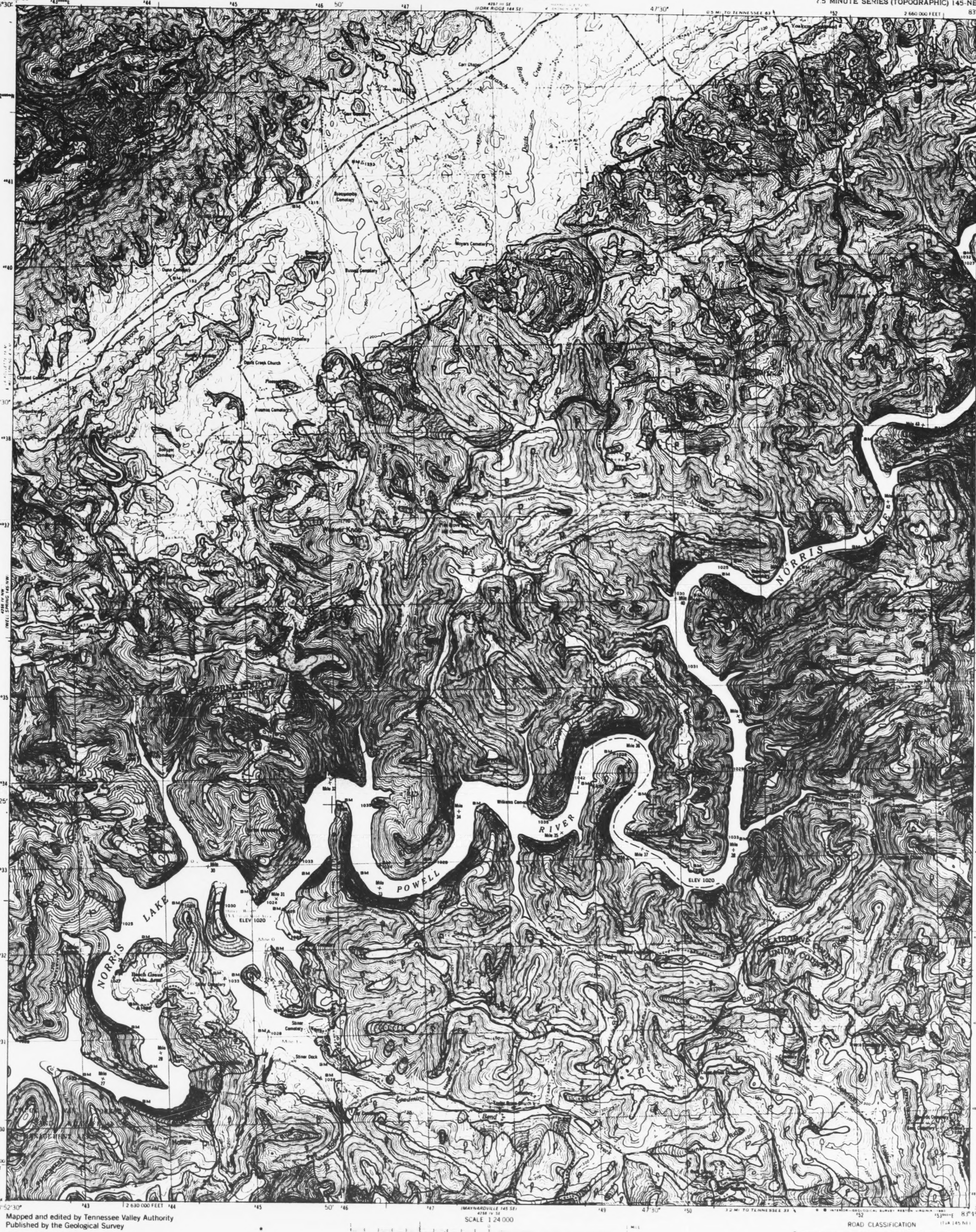
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

AUSMUS QUADRANGLE
TENNESSEE
7.5 MINUTE SERIES (TOPOGRAPHIC) 145-NE



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Published by the Geological Survey

Control by NOS/NOAA, USGS, and TVA

Revised by TVA in 1952 by photogrammetric methods using aerial photographs taken 1952 and by reference to TVA-USGS quadrangle dated 1942. Map field checked by TVA, 1952

Polyconic projection. 10,000-foot grid ticks based on Tennessee coordinate system. 1000-meter Universal Transverse Mercator grid, zone 17. 1927 North American Datum. To place on the predicted North American Datum 1983 move the projection lines 6 meters south and 8 meters west as shown by dashed corner ticks

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UTM GRID AND 1980 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Primary highway, all weather, hard surface
Light duty road, all weather, improved surface
Secondary highway, all weather, hard surface
Unimproved road, fair or dry weather
Interstate Route
U. S. Route
State Route

AUSMUS, TENN.
N3622.5-W8345/7.5

1952

LANDSLIDES AND RELATED FEATURES

OF THE AUSMUS, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(D-2)

field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

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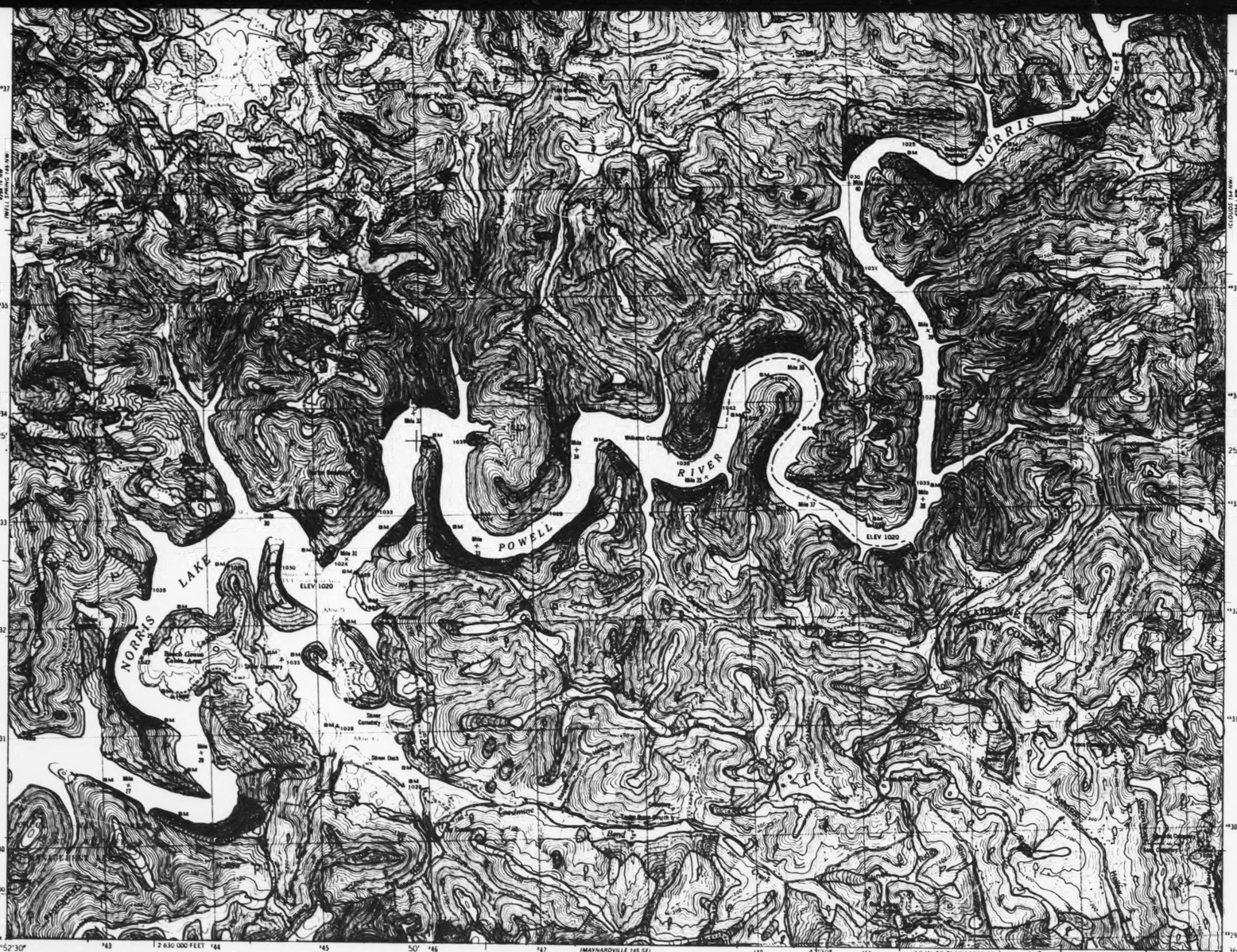
MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one



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Published by the Geological Survey

Control by NOS/NOAA, USGS, and TVA

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SCALE 1:24 000

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1986 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Primary highway, all weather, hard surface	Light duty road, all weather, improved surface
Secondary highway, all weather, hard surface	Unimproved road, fair or dry weather

Interstate Route | U.S. Route | State Route

AUSMUS, TENN.
N3622.5-W8345/7.5

1982

LANDSLIDES AND RELATED FEATURES

OF THE AUSMUS, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(D-2)

field check 1980-1981

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P **OLD LANDSLIDE**
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V **COLLUVIAL SLOPE**
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol D designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

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Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

sh	bench with high wall
sf	furrowed with high wall
sd	multiple furrows and multiple benches
ss	hilltop removed
srg	reclaimed by grading
sru	reclaimed by secondary use
sh/r	regraded in part, high wall remains

Coal refuse banks

r	identified on aerial photographs; not classified in field check
rb	not burnt nor on fire
rbb	burnt
rbd	burning
rbs	sludge

Quarries

q	quarry site
qub	spoil bank, quarry waste

Gravel pits

g	site of gravel pit

Slides in man-made features

af	earth flow in fill
a/s	earth flow in strip castings
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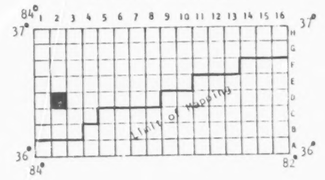
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

CLOUDS QUADRANGLE
TENNESSEE
7.5 MINUTE SERIES (TOPOGRAPHIC) 154-NW

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by USC&GS, USGS, and TVA

Complete field revision by TVA 1952, using aerial photographs taken 1952, and by reference to TVA-USGS quadrangle dated 1941. Original map compiled by multiplex methods from aerial photographs taken 1940.

Polyconic projection. 1927 North American datum
10,000-foot grid based on Tennessee rectangular coordinate system

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

QUADRANGLE LOCATION

ROAD CLASSIFICATION

HARD SURFACE ALL WEATHER ROADS	DRY WEATHER ROADS
Heavy duty	Improved dirt
Medium duty	Unimproved dirt
Loose surface, graded, or narrow hard surface	

(30) U. S. Route (88) State Route

CLOUDS, TENN.
N3622.5-W8352.5/7.5
1952

field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE CLOUDS, TENN. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(D-3)

NOTE

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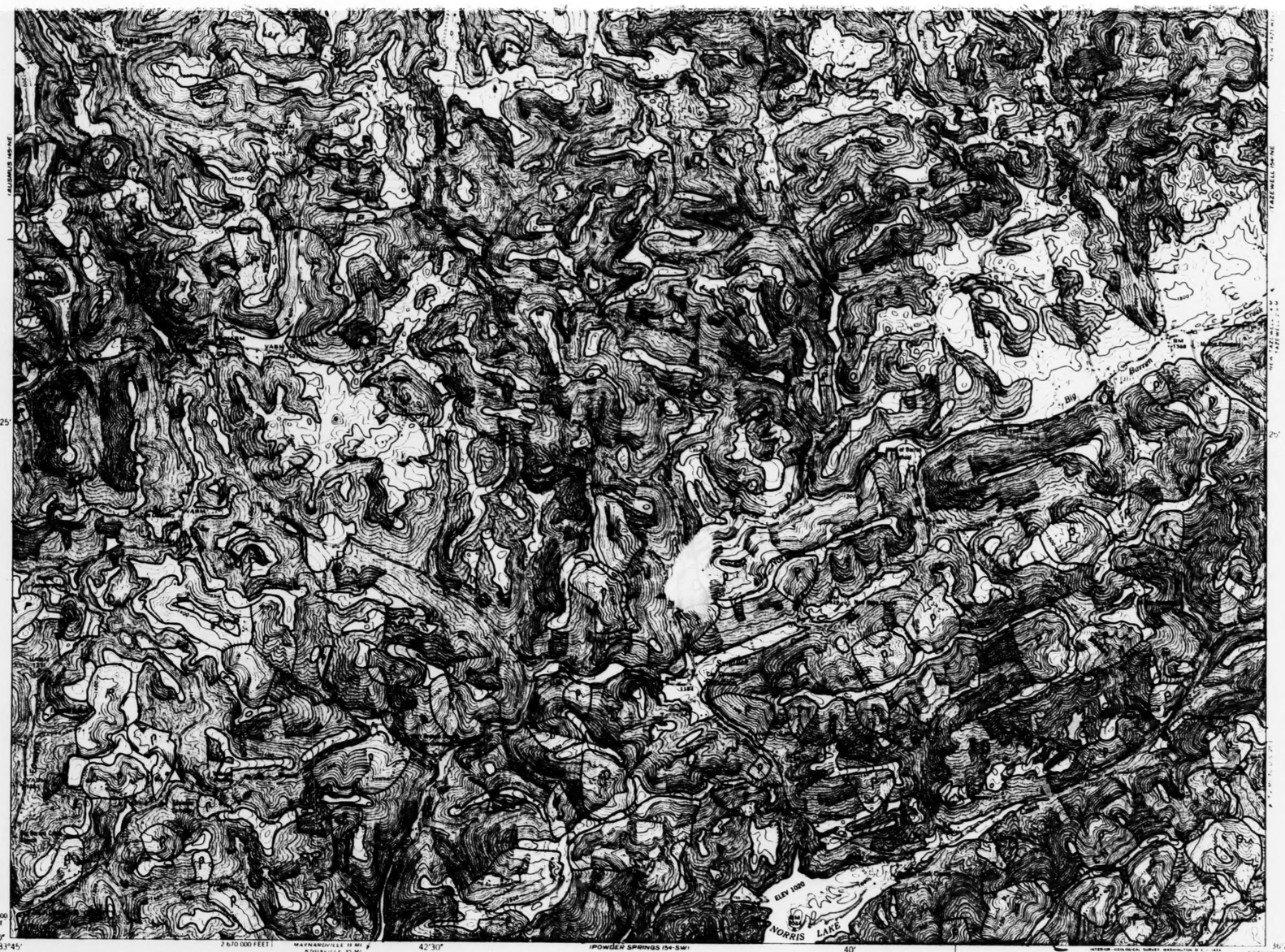
MAN-MADE FEATURES



Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by USC&GS, USGS, and TVA

Complete field revision by TVA 1952, using aerial photographs taken 1952, and by reference to TVA 1950 quadrangle dated 1941. Original map compiled by multiplex methods from aerial photographs taken 1940

Polyconic projection. 1927 North American datum
10 000-foot grid based on Tennessee coordinate system

SCALE 1:24 000

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

APPROXIMATE MEAN DECLINATION 1952

QUADRANGLE LOCATION

ROAD CLASSIFICATION

HARD SURFACE ALL WEATHER ROADS		DRY WEATHER ROADS
Heavy duty		Improved dirt
Medium duty		Unimproved dirt
Loose surface, graded, or narrow hard surface		

(30) U. S. Route (30) State Route

CLOUDS, TENN.
N3622.5 W8337.5/7.5

1952

Field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE CLOUDS, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(D-3)

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COLLUVIAL SLOPE
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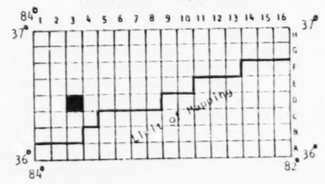

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

TAZEWELL QUADRANGLE
TENNESSEE-CLAIBORNE CO.
7.2 MINUTE SERIES (TOPOGRAPHIC) 154-NE

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by USC&GS, USGS, and TVA

Topography by USGS by photogrammetric methods
Map field checked by TVA, 1943

Polyconic projection. 1927 North American datum
10,000 foot grid based on Tennessee rectangular coordinate system
1000 meter Universal Transverse Mercator Grid ticks, Zone 17, shown in blue

UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION
Heavy duty — Poor motor road
Medium duty — Wagon and jeep track
Light duty — Foot trail
U.S. Route — State Route
In developed areas, only through roads are classified

TAZEWELL, TENN.
N3622.5-W8330-7.5
1943

LANDSLIDES AND RELATED FEATURES

OF THE TAZEWELL, TENN. QUADRANGLE

by
William F. Outerbridge

1982
U.S. Geological Survey
OPEN FILE MAP 82-0422(D-4)

field check 1980-1981

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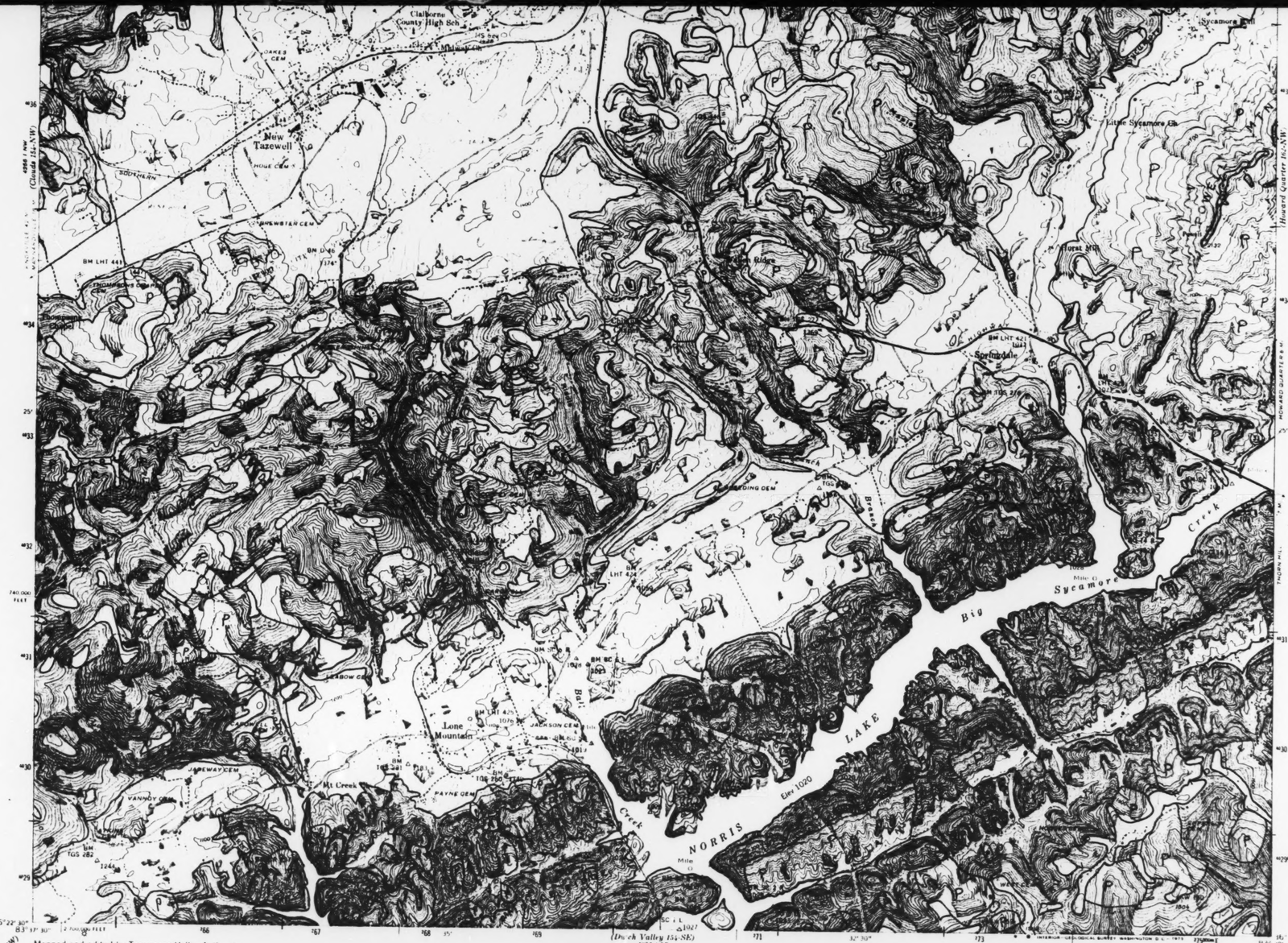
MAN-MADE FEATURES

Strip mines (combination of letter symbols



Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by USC&GS, USGS, and TVA

Topography by USGS by photogrammetric methods
Map field checked by TVA, 1943

Polyconic projection. 1927 North American datum
10,000-foot grid based on Tennessee rectangular coordinate system
1000 meter Universal Transverse Mercator grid ticks, Zone 17, shown in blue

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Heavy duty	Four motor road
Medium duty	Wagon and jeep track
Light duty	Foot trail
U. S. Route	State Route

In developed areas, only through roads are classified.

QUADRANGLE LOCATION

TAZEWELL, TENN.
N36.5-W83.5/7.5
1943

Field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE TAZEWELL, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(D-4)

ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol ⚠ designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

sh	bench with high wall
sf	furrowed with high wall
sd	multiple furrows and multiple benches
ss	hilltop removed
srg	reclaimed by grading
sru	reclaimed by secondary use
sh/r	regraded in part, high wall remains

Coal refuse banks

r	identified on aerial photographs; not classified in field check
rb	not burnt nor on fire
rbb	burnt
rbd	burning
rbs	sludge

Quarries

q	quarry site
qub	spoil bank, quarry waste

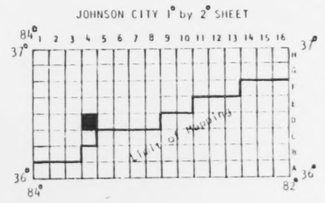
Gravel pits

g	site of gravel pit

Slides in man-made features

af	earth flow in fill
a/s	earth flow in strip castings
a/r	earth flow in coal refuse

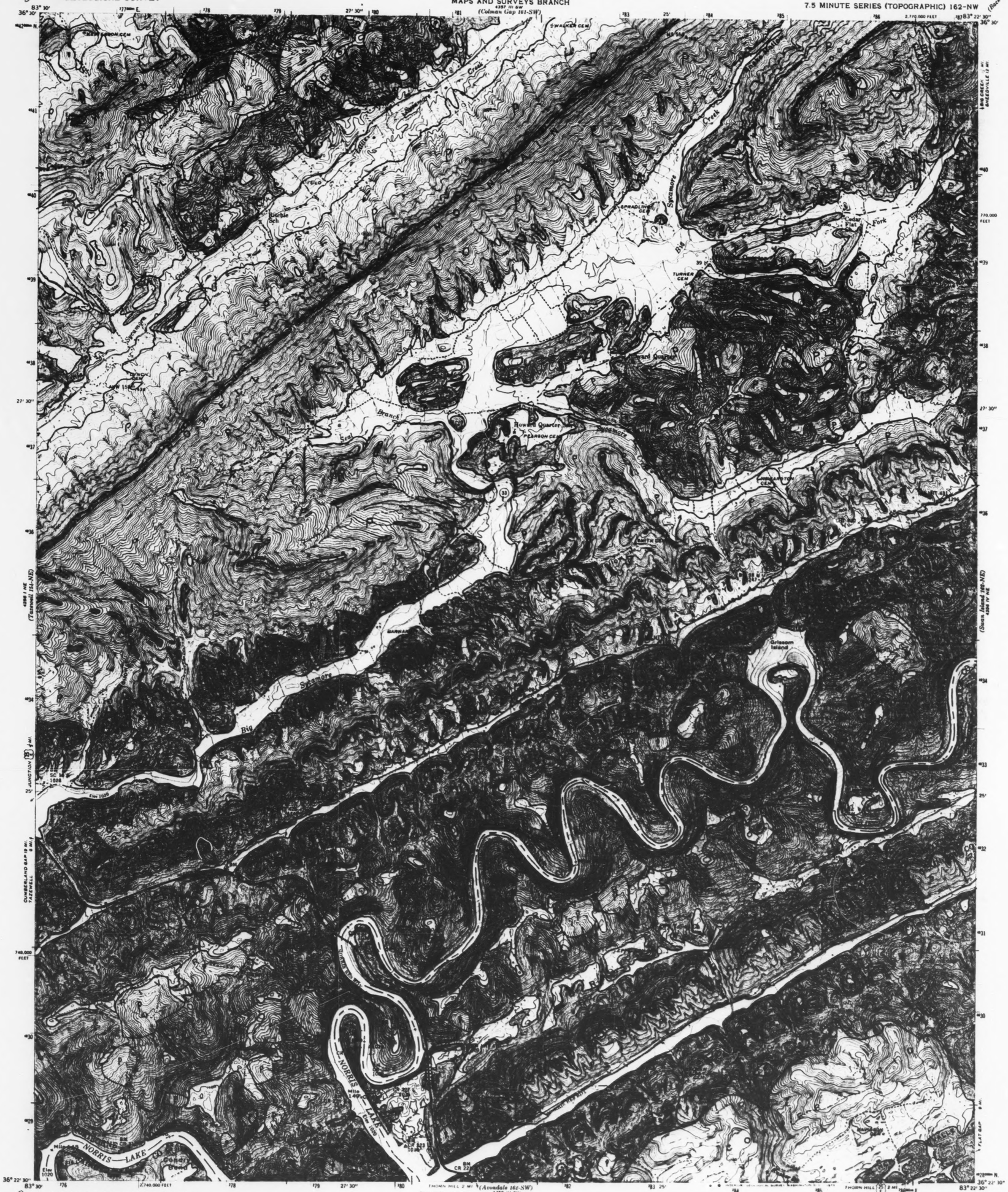
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

HOWARD QUARTER QUADRANGLE
TENNESSEE
7.5 MINUTE SERIES (TOPOGRAPHIC) 162-NW



Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by USC&GS, USGS, and TVA

Topography by USGS by photogrammetric methods
Map field checked by TVA, 1942

Polyconic projection. 1927 North American datum
10,000 foot grid based on Tennessee rectangular coordinate system
1000 meter Universal Transverse Mercator Grid ticks, Zone 17, shown in blue

UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

Heavy duty	Poor motor road
Medium duty	Wagon and jeep track
Light duty	Foot trail
U.S. Route	State Route

HOWARD QUARTER, TENN.
N3622.5/W8322.5/7.5

1942

PHOTOREVISED 1971

LANDSLIDES AND RELATED FEATURES

OF THE HOWARD QUARTER, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(D-5)

field check 1980-1981

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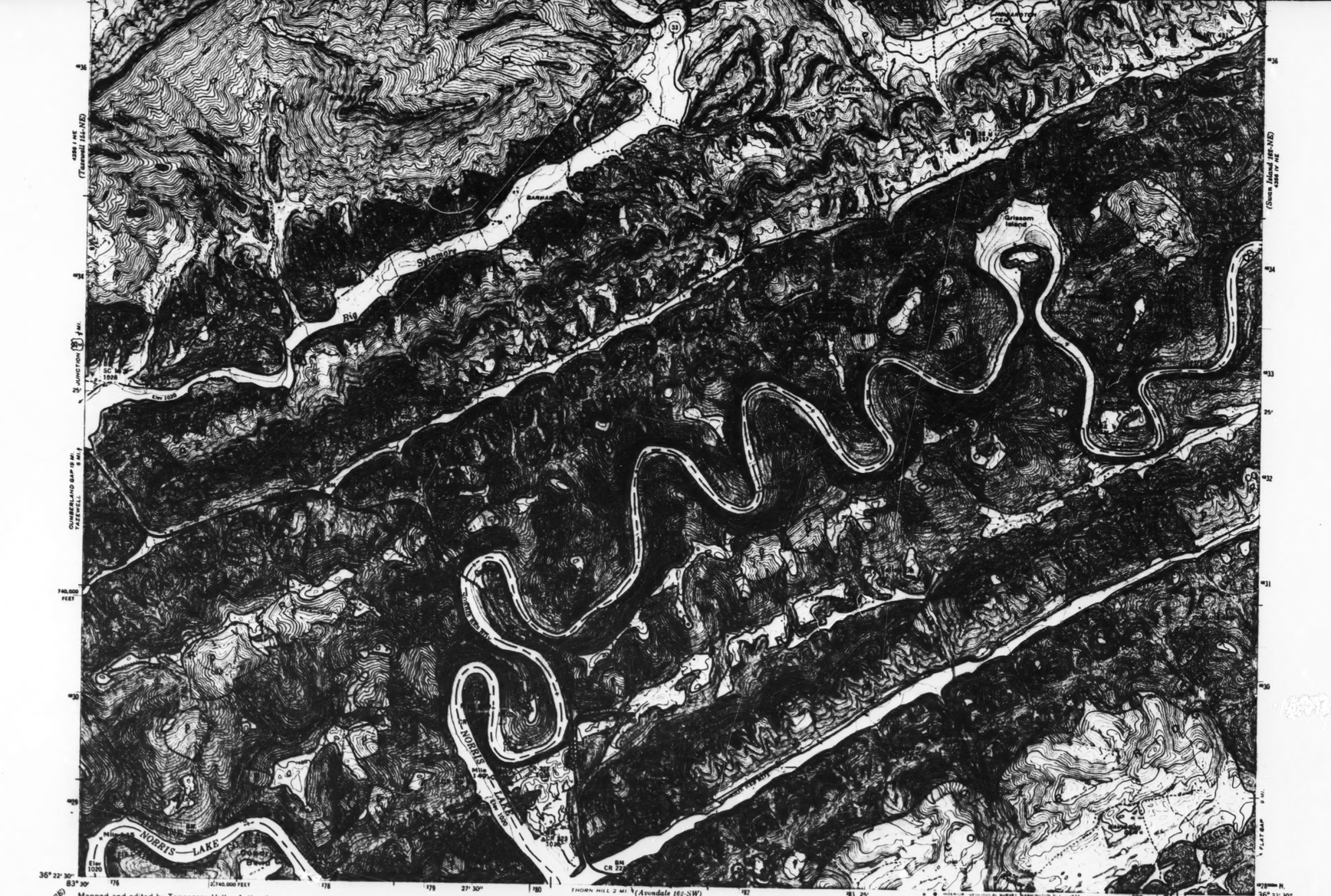

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Published by the Geological Survey

Control by USC&GS, USGS, and TVA

Topography by USGS by photogrammetric methods
Map field checked by TVA, 1942

Polyconic projection. 1927 North American datum
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SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION

Heavy duty — Poor motor road
Medium duty — Wagon and jeep track
Light duty — Foot trail
U.S. Route — State Route

HOWARD QUARTER, TENN.

N3622.5-W8322.5/7.5

1942

PHOTOREVISED 1971

Field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE HOWARD QUARTER, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(D-5)

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Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol d designates historical debris flow or debris avalanche.

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

- sb — bench with high wall
- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

Coal refuse banks

- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries

- q — quarry site
- qub — spoil bank, quarry waste

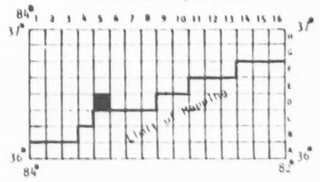
Gravel pits

- g — site of gravel pit

Slides in man-made features

- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

SWAN ISLAND QUADRANGLE
TENNESSEE
7.5 MINUTE SERIES (TOPOGRAPHIC) 162-NE

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by USC&GS, USGS, and TVA

Topography by USGS by photogrammetric methods
Map field checked by TVA, 1941

Polyconic projection. 1927 North American datum
10,000-foot grid based on Tennessee rectangular coordinates system
1000 meter Universal Transverse Mercator Grid ticks, Zone 17, shown in blue

UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy duty		Poor motor road	
Medium-duty		Wagon and jeep track	
Light-duty		Foot trail	

U. S. Route ○ State Route

SWAN ISLAND, TENN.
N3622.5/W8315/7.5

1941
PHOTOREVISED 1971

field check 1980-1981

This report is preliminary and has not **been reviewed for conformity** with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE SWAN ISLAND, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

NOTE

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Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by USC&GS, USGS, and TVA

Topography by USGS by photogrammetric methods
Map field checked by TVA, 1941

Polyconic projection. 1927 North American datum
10,000-foot grid based on Tennessee rectangular coordinate system
1000 meter Universal Transverse Mercator Grid ticks, Zone 17, shown in blue

UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

ROAD CLASSIFICATION
Heavy-duty — Poor motor road
Medium-duty — Wagon and jeep track
Light-duty — Foot trail
U. S. Route — State Route

SWAN ISLAND, TENN.
N3622.5-W8315/7.5
1941
PHOTOREVISED 1971

LANDSLIDES AND RELATED FEATURES

OF THE SWAN ISLAND, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (D-6)

field check 1980-1981

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ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

P — OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V — COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

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Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol designates historical debris flow or debris avalanche.

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Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

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AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)
- sh — bench with high wall
- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
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Coal refuse banks
- r — identified on aerial photographs; not classified in field check
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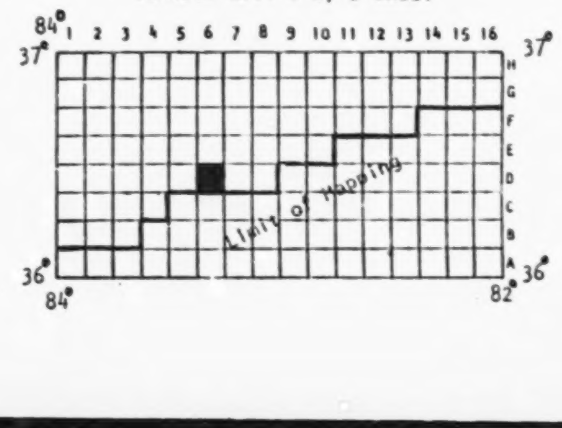
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
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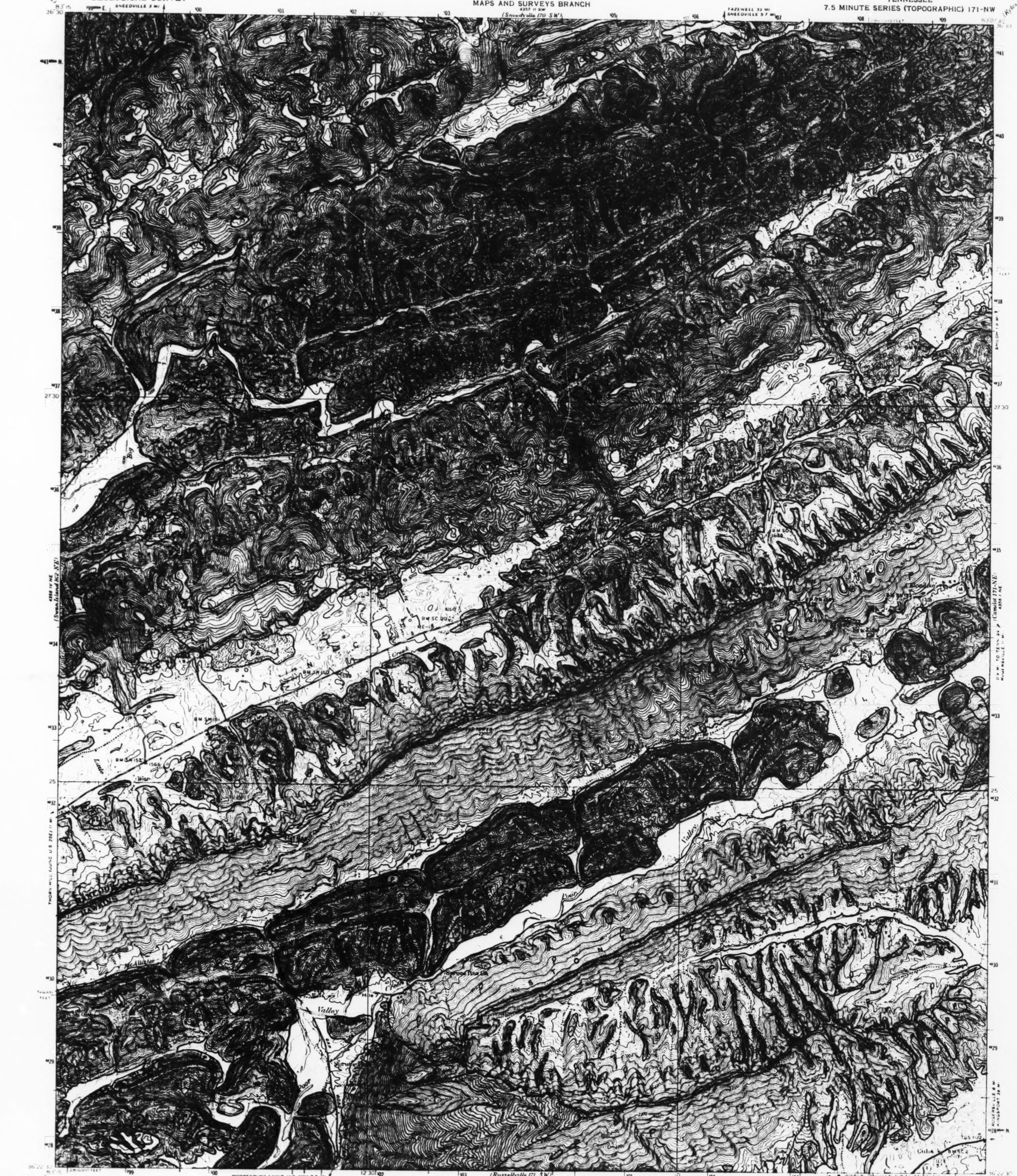
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

LEE VALLEY QUADRANGLE
TENNESSEE
7.5 MINUTE SERIES (TOPOGRAPHIC) 171-NW



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Published by the Geological Survey

Control by USC&GS, USGS, and TVA

Topography by USGS by photogrammetric methods
Map field checked by TVA, 1939

Polyconic projection. 1927 North American datum
10,000 foot grid based on Tennessee rectangular coordinate system
1000 meter Universal Transverse Mercator Grid ticks
Zone 17, shown in blue

UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DASHED LINE REPRESENTS HALF-INTERVAL CONTOUR
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

Heavy Duty	Four-wheel road
Medium Duty	Wagon and jeep track
Light Duty	Foot trail
U.S. Route	State Route

LEE VALLEY, TENN.
N3500-W8452.5/7.5
1939
PHOTOREVISED 1971

LANDSLIDES AND RELATED FEATURES

OF THE LEE VALLEY, TENN. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(D-7)

Field check 1980-1981

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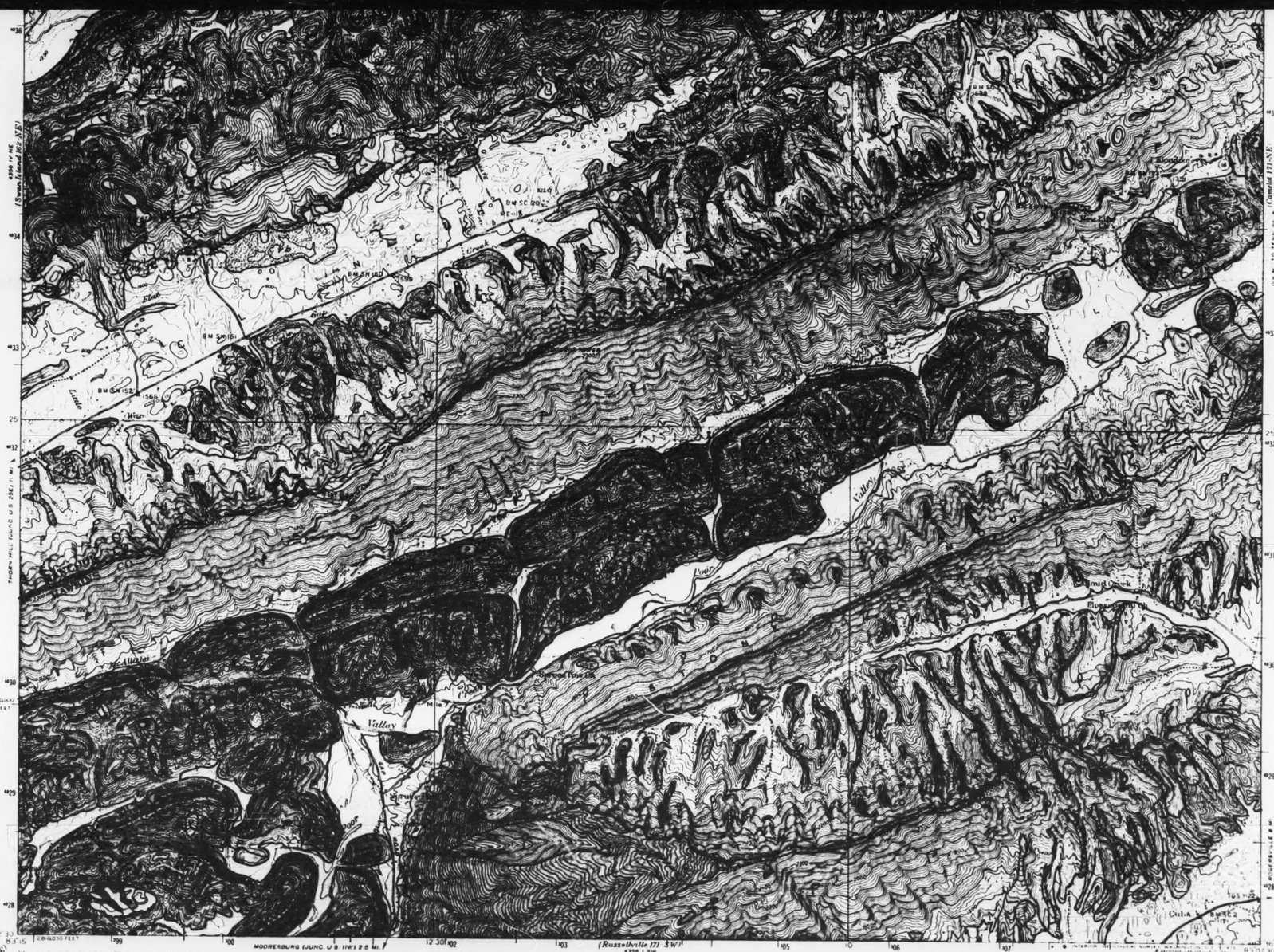

LANDSLIDES AND RELATED FEATURES

OF THE LEE VALLEY, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(D-7)

field check 1980-1981

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- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

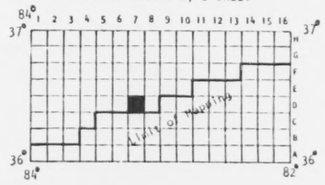
Coal refuse banks
- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries
- q — quarry site
- qub — spoil bank, quarry waste

Gravel pits
- g — site of gravel pit

Slides in man-made features
- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

CAMELOT QUADRANGLE
TENNESSEE-HAWKINS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC) 171-NE

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS/NOAA, USGS, WPA, and TVA

Polyconic projection. 1927 North American datum
10,000 foot grid based on Tennessee rectangular coordinate system
1000 metre Universal Transverse Mercator grid ticks, Zone 17, shown in blue

UTM GRID AND 1976 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

CAMELOT, TENN.

1961

LANDSLIDES AND RELATED FEATURES

OF THE CAMELOT, TENN. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (D-8)

field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

NOTE

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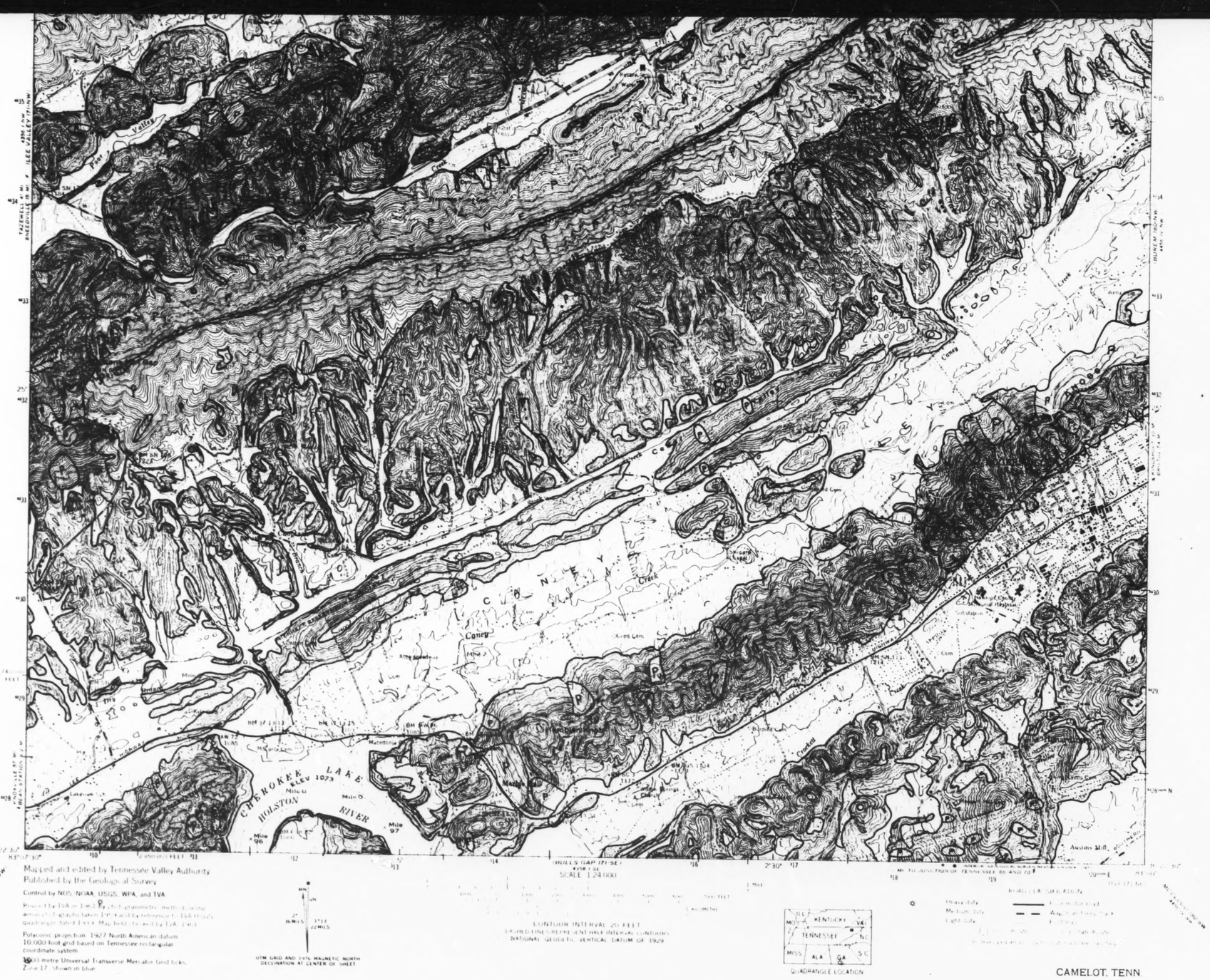

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS, NOAA, USGS, WPA, and TVA

Photography taken 1942. Planimetric detail compiled from aerial photographs taken 1961. Field checked by reference to TVA black and white orthophotographs dated 1959. Map field checked by TVA 1961

Polyconic projection. 1927 North American datum
10,000 foot grid based on Tennessee rectangular coordinate system

1000 metre Universal Transverse Mercator grid ticks, Zone 17, shown in blue

UTM GRID AND 1970 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 20 FEET
DASHED LINES REPRESENT HALF INTERVAL CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

CAMELOT, TENN.
N3622.5—W8452.5/7.5
1961

LANDSLIDES AND RELATED FEATURES

OF THE CAMELOT, TENN. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (D-8)

field check 1980-1981

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ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

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Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)
- sb bench with high wall
- sf furrowed with high wall
- sd multiple furrows and multiple benches
- ss hilltop removed
- srg reclaimed by grading
- sru reclaimed by secondary use
- sb/r regraded in part, high wall remains

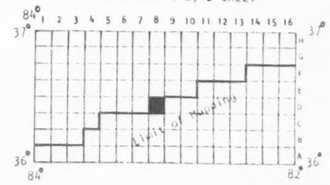
Coal refuse banks
- r identified on aerial photographs; not classified in field check
- rb not burnt nor on fire
- rbb burnt
- rbd burning
- rbs sludge

Quarries
- q quarry site
- qub spoil bank, quarry waste

Gravel pits
- g site of gravel pit

Slides in man-made features
- af earth flow in fill
- a/s earth flow in strip castings
- a/r earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET

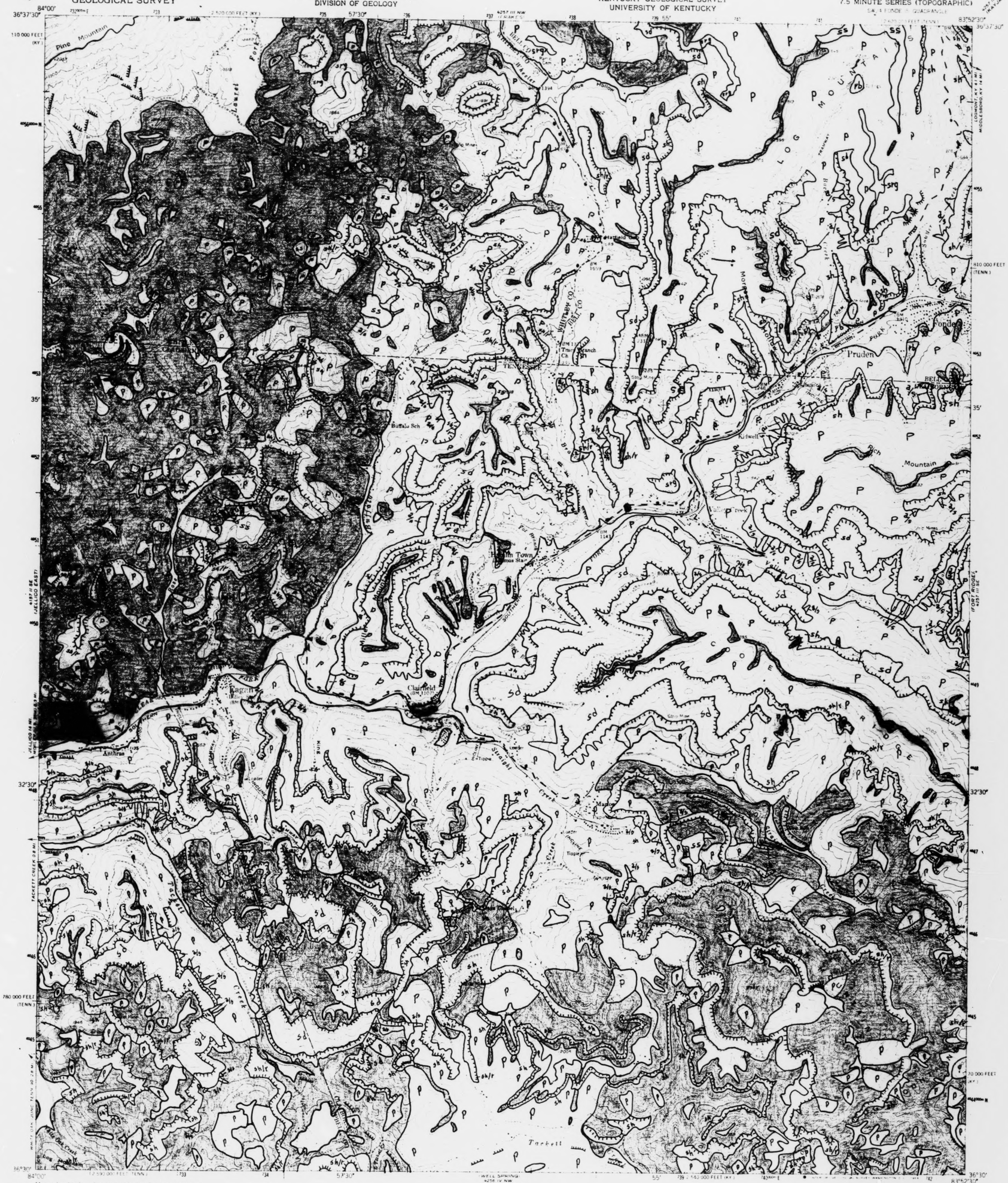


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF TENNESSEE
DEPARTMENT OF CONSERVATION
DIVISION OF GEOLOGY

STATE OF KENTUCKY
KENTUCKY GEOLOGICAL SURVEY
UNIVERSITY OF KENTUCKY

EAGAN QUADRANGLE
TENNESSEE–KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography from aerial photographs by multiplex methods
Aerial photographs taken 1961. Field check 1953

Polyconic projection. 1927 North American datum
10,000-foot grid based on Tennessee coordinate system, and Kentucky coordinate system south zone
1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

Heavy duty — Light duty
Medium duty — Unimproved dirt
U.S. Route — State Route

EAGAN, TENN.-KY.
N3630-W8352.5/7.5
1953

LANDSLIDES AND RELATED FEATURES

OF THE EAGAN, TENN.-KY. QUADRANGLE

by
William E. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(E-1)

Field check 1980-1981

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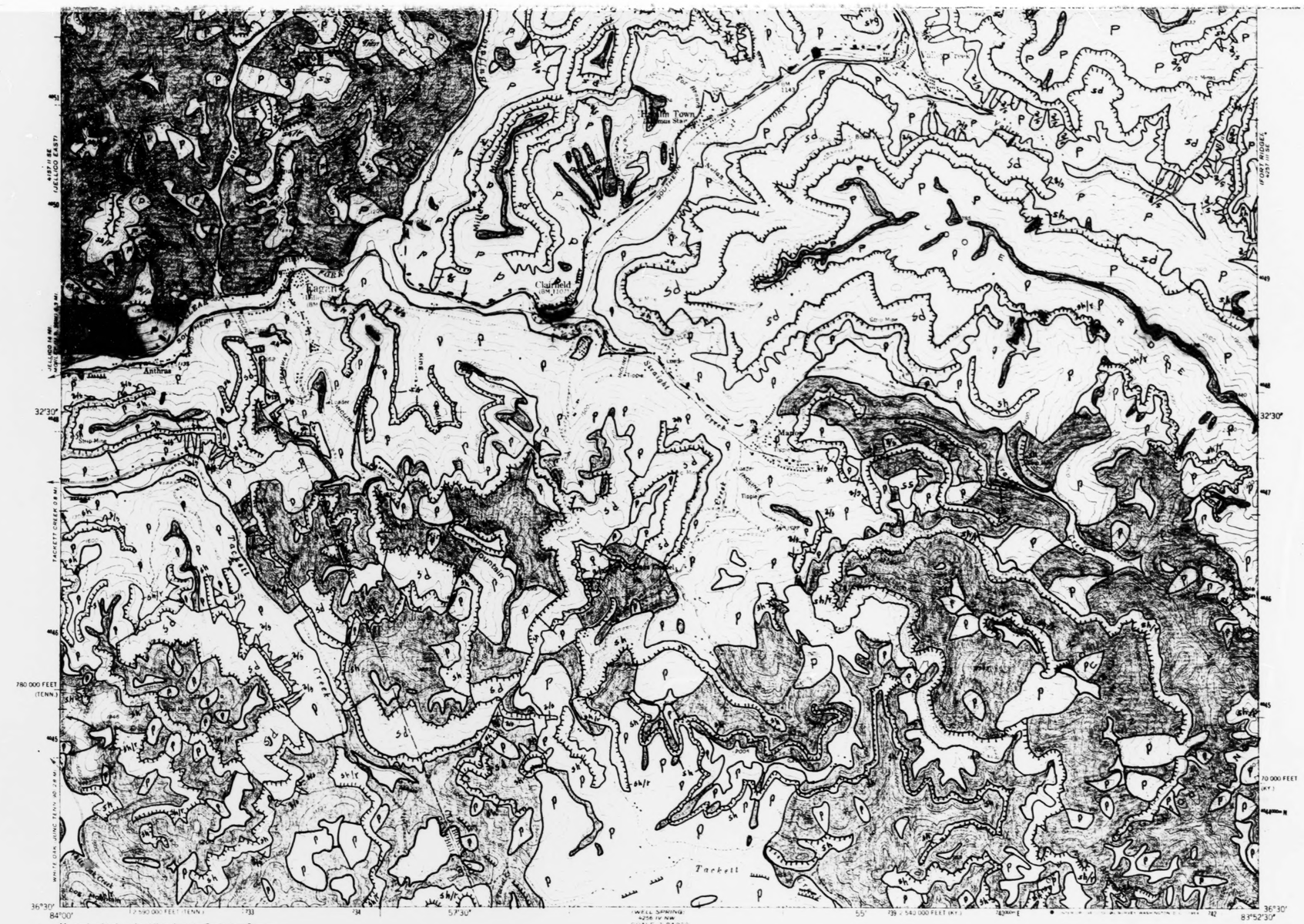

Mapped, edited, and published by the Geological Survey

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Aerial photographs taken 1961. Field check 1953

Polyconic projection. 1927 North American datum
10,000 foot grid based on Tennessee coordinate system, and Kentucky coordinate system south zone
1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

ROAD CLASSIFICATION

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Medium duty — Unimproved dirt
U.S. Route — State Route

EAGAN, TENN.-KY.

N3630-W8352.5/7.5

1953

field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE EAGAN, TENN.-KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(E-1)

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P — OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V — COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol ▲ designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

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Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystore, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

sh	bench with high wall
sf	furrowed with high wall
sd	multiple furrows and multiple benches
ss	hilltop removed
srg	reclaimed by grading
sru	reclaimed by secondary use
sh/r	regraded in part, high wall remains

Coal refuse banks

r	identified on aerial photographs; not classified in field check
rb	not burnt nor on fire
rbb	burnt
rbd	burning
rbs	sludge

Quarries

q	quarry site
qub	spoil bank, quarry waste

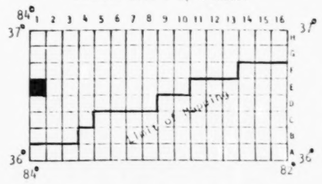
Gravel pits

g	site of gravel pit

Slides in man-made features

af	earth flow in fill
a/s	earth flow in strip castings
a/r	earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET

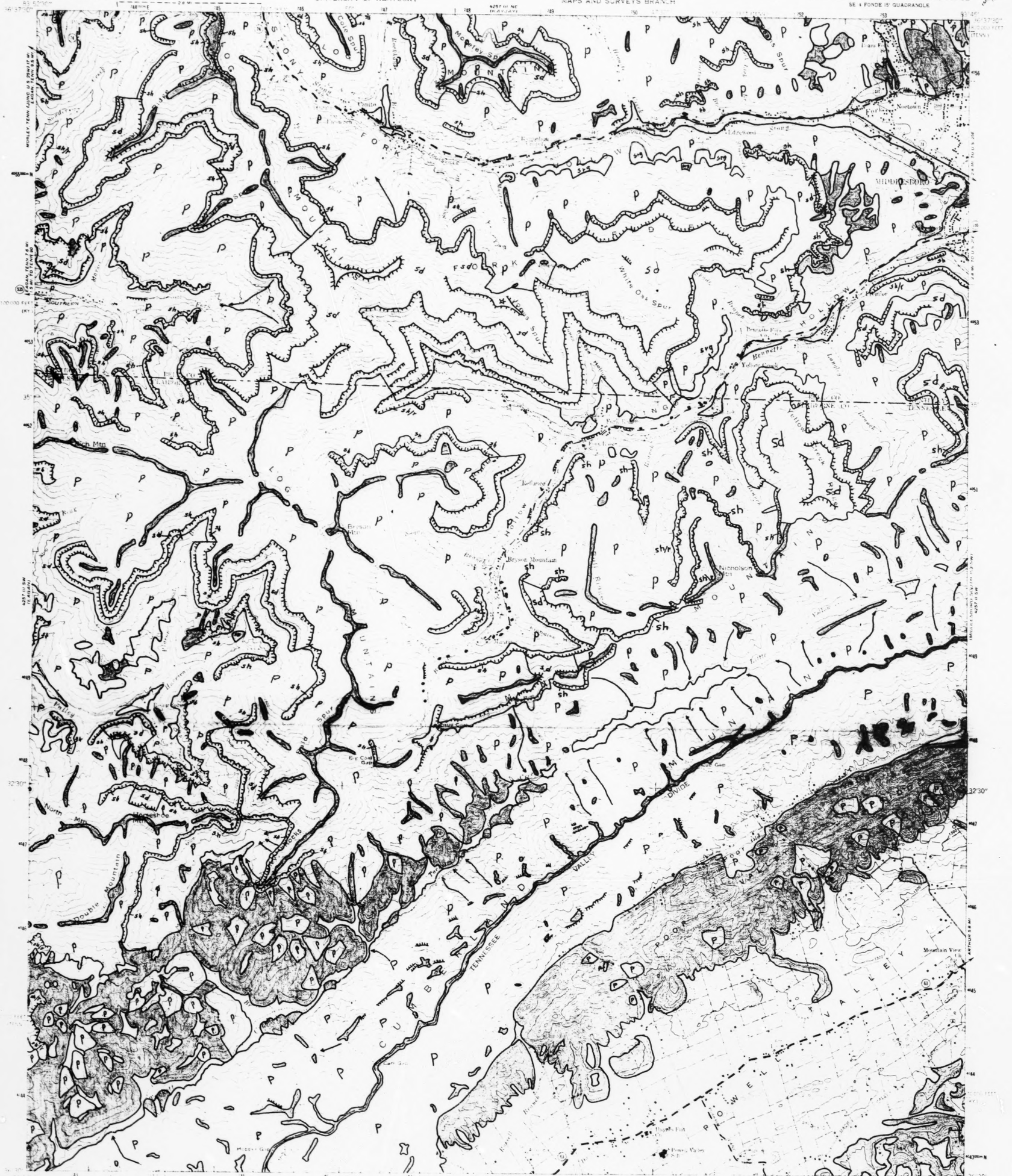


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
KENTUCKY GEOLOGICAL SURVEY
UNIVERSITY OF KENTUCKY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

FORK RIDGE QUADRANGLE
TENNESSEE KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC) 144 SE
SE 4 FONDE (5) QUADRANGLE



FORK RIDGE, TENN.—KY.
QUADRANGLE
1959

LANDSLIDES AND RELATED FEATURES

OF THE FORK RIDGE, TENN.-KY. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(E-2)

field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Data on landslides and strip mines in part From Rice, C.L. and Maughan, E.K., 1978, Geologic map of the Kay jay quadrangle and part of the Fork Ridge quadrangle, Bell and Knox Counties, Kentucky: U.S. Geological Survey Geologic

NOTE

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LANDSLIDES AND RELATED FEATURES

OF THE FORK RIDGE, TENN.-KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

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AREAS LEAST PRONE TO LANDSLIDES

Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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- sh/r regraded in part, high wall remains

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- r identified on aerial photographs; not classified in field check
- rb not burnt nor on fire
- rbb burnt
- rbd burning
- rbs sludge

Quarries

- q quarry site
- qub spoil bank, quarry waste

Gravel pits

- g site of gravel pit

Slides in man-made features

- af earth flow in fill
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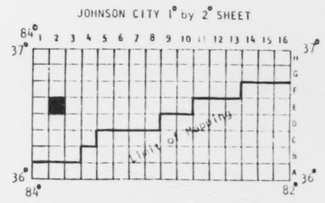
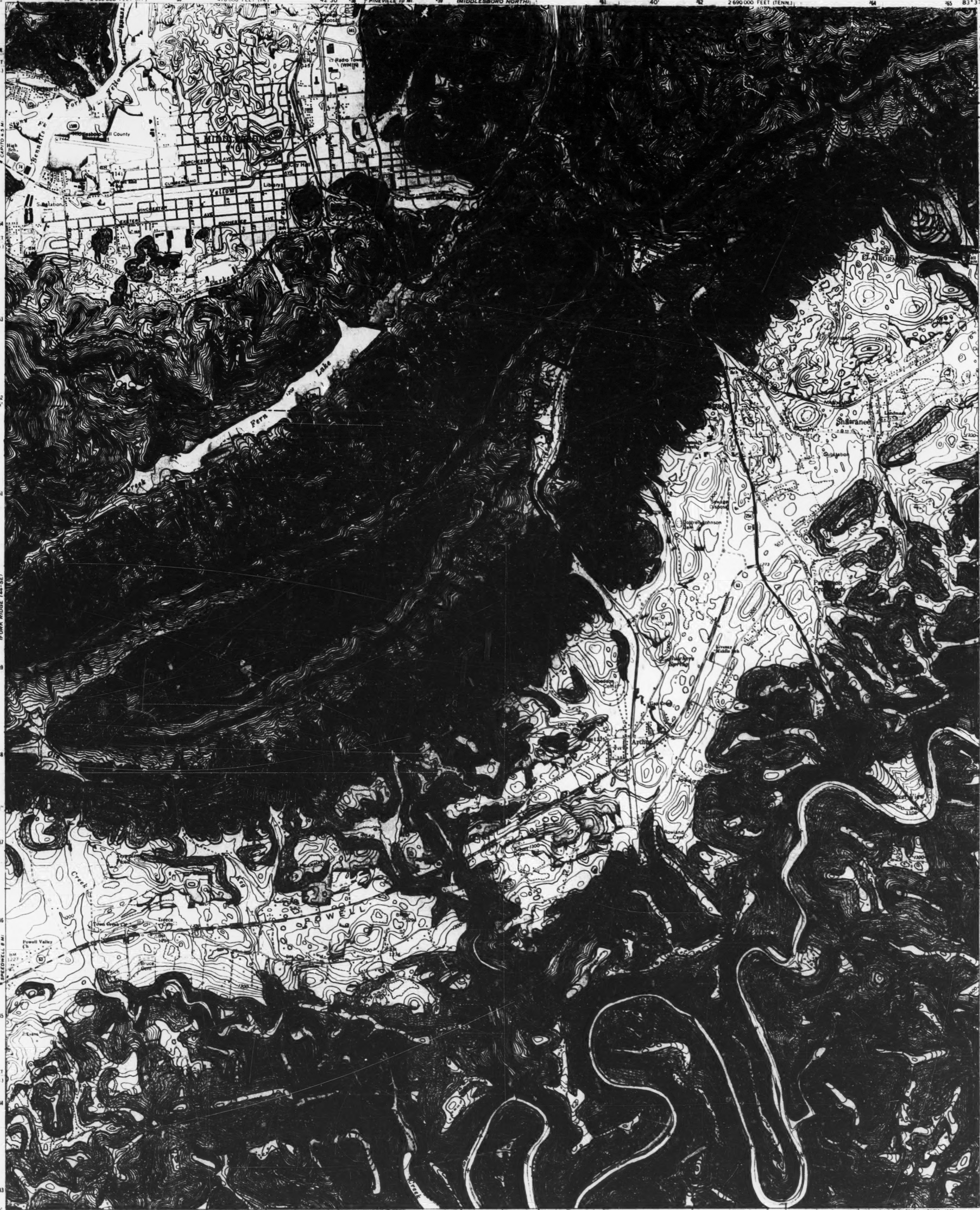
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
KENTUCKY GEOLOGICAL SURVEY
UNIVERSITY OF KENTUCKY

MIDDLESBORO SOUTH QUADRANGLE
TENNESSEE – KENTUCKY – VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC) 153-SW
SW/4 MIDDLESBORO 15 QUADRANGLE



Mapped by the Tennessee Valley Authority
Edited and published by the Geological Survey

Control by USGS, NOS/NOAA, and Tennessee Valley Authority

Topography by photogrammetric methods from aerial photographs taken 1953. Field checked 1955. Revised from aerial photographs taken 1973. Field checked 1974

Polyconic projection. 1927 North American datum
10,000-foot grids based on Tennessee coordinate system, Kentucky coordinate system, south zone, and Virginia coordinate system, south zone
1000-metre Universal Transverse Mercator grid ticks, zone 17, shown in blue

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Primary highway, hard surface — Light duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U S Route — State Route

TENNESSEE
QUADRANGLE LOCATION

MIDDLESBORO SOUTH, TENN. – KY. – VA.
SW/4 MIDDLESBORO 15 QUADRANGLE
N3630—W8337.5/7.5

1974

TVA 153-SW

Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE MIDDLESBORO SOUTH, TENN.-KY.-VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(E-3)

NOTE

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MAN-MADE FEATURES

(AUSMUS 145-NE)

Mapped by the Tennessee Valley Authority
Edited and published by the Geological Survey

Control by USGS, NOS/NOAA, and Tennessee Valley Authority

Topography by photogrammetric methods from aerial photographs taken 1953. Field checked 1955. Revised from aerial photographs taken 1973. Field checked 1974

Polyconic projection. 1927 North American datum
10,000-foot grids based on Tennessee coordinate system, Kentucky coordinate system, south zone, and Virginia coordinate system, south zone
1000-metre Universal Transverse Mercator grid ticks, zone 17, shown in blue

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

TVA 153-SW

ROAD CLASSIFICATION

Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U. S. Route — State Route

(TAZEWELL 154-NE)

TENNESSEE
QUADRANGLE LOCATION

MIDDLESBORO SOUTH, TENN.–KY.–VA.
SW/4 MIDDLESBORO 15' QUADRANGLE
N3630—W8337.5/7.5

1974

Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981
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LANDSLIDES AND RELATED FEATURES

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by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(E-3)

ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

P — OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V — COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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MAN-MADE FEATURES
Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)
- sh — bench with high wall
- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

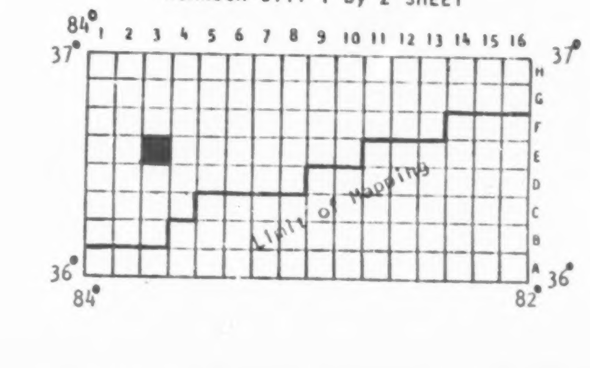
Coal refuse banks
- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries
- q — quarry site
- qub — spoil bank, quarry waste

Gravel pits
- g — site of gravel pit

Slides in man-made features
- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

WHEELER QUADRANGLE
TENNESSEE-VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC) 153 SE

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS/NOAA, USGS, and TVA

Topography by photogrammetric methods using aerial photographs taken 1953. Map field checked by TVA 1956

ROAD CLASSIFICATION

Heavy duty — Poor motor road
Medium duty — Wagon and jeep track
Light duty — Foot trail
U.S. Route — State Route

WHEELER, TENN.-VA

1956

LANDSLIDES AND RELATED FEATURES

OF THE WHEELER, TENN.-VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(E-4)

field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Data on landslides in part from Harris, L.D. 1965, Geologic map of the Wheeler Quadrangle, Claiborne County, Tennessee and Lee County, Virginia: U.S. Geological Survey Geologic Quadrangle Map GQ-435, scale 1:24000.

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MAN MADE FEATURES

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS/NOAA, USGS, and TVA

Topography by photogrammetric methods from aerial photographs taken 1954. Field checked by TVA, 1956

Projection (Grid) 10,000-foot grid based on Tennessee coordinate system
Transverse Mercator projection
1000-meter Universal Transverse Mercator grid ticks, Zone 17, shown in blue

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 20 FEET

ROAD CLASSIFICATION

Heavy duty — Light duty — Medium duty — Unimproved dirt — Foot trail — U.S. Route — State Route

WHEELER, TENN.-VA.

1956

LANDSLIDES AND RELATED FEATURES

OF THE WHEELER, TENN.-VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

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OLD LANDSLIDE

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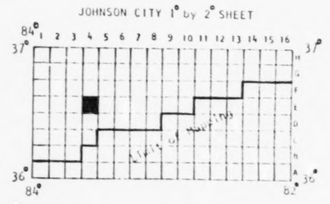
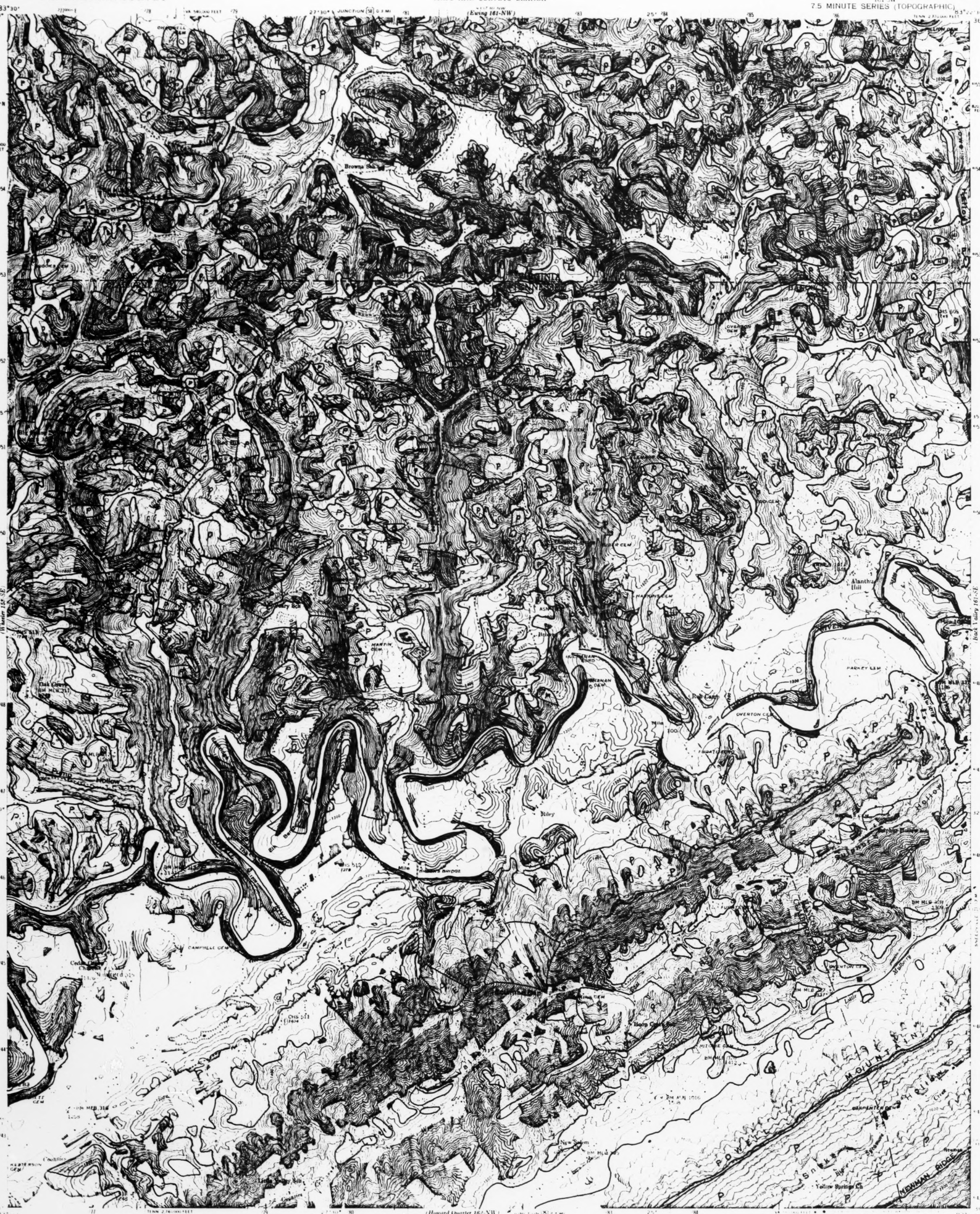
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

TENNESSEE-VIRGINIA
COLEMAN GAP QUADRANGLE
7.5 MINUTE SERIES (TOPOGRAPHIC)



Control by USC&GS, USGS, and TVA
Topography by USGS and TVA from aerial photographs by stereophotogrammetric methods
Field examination by Tennessee Valley Authority, 1936

COLEMAN GAP, TENN.-VA.

Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE COLEMAN GAP, TENN.-VA. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(E-5)

NOTE

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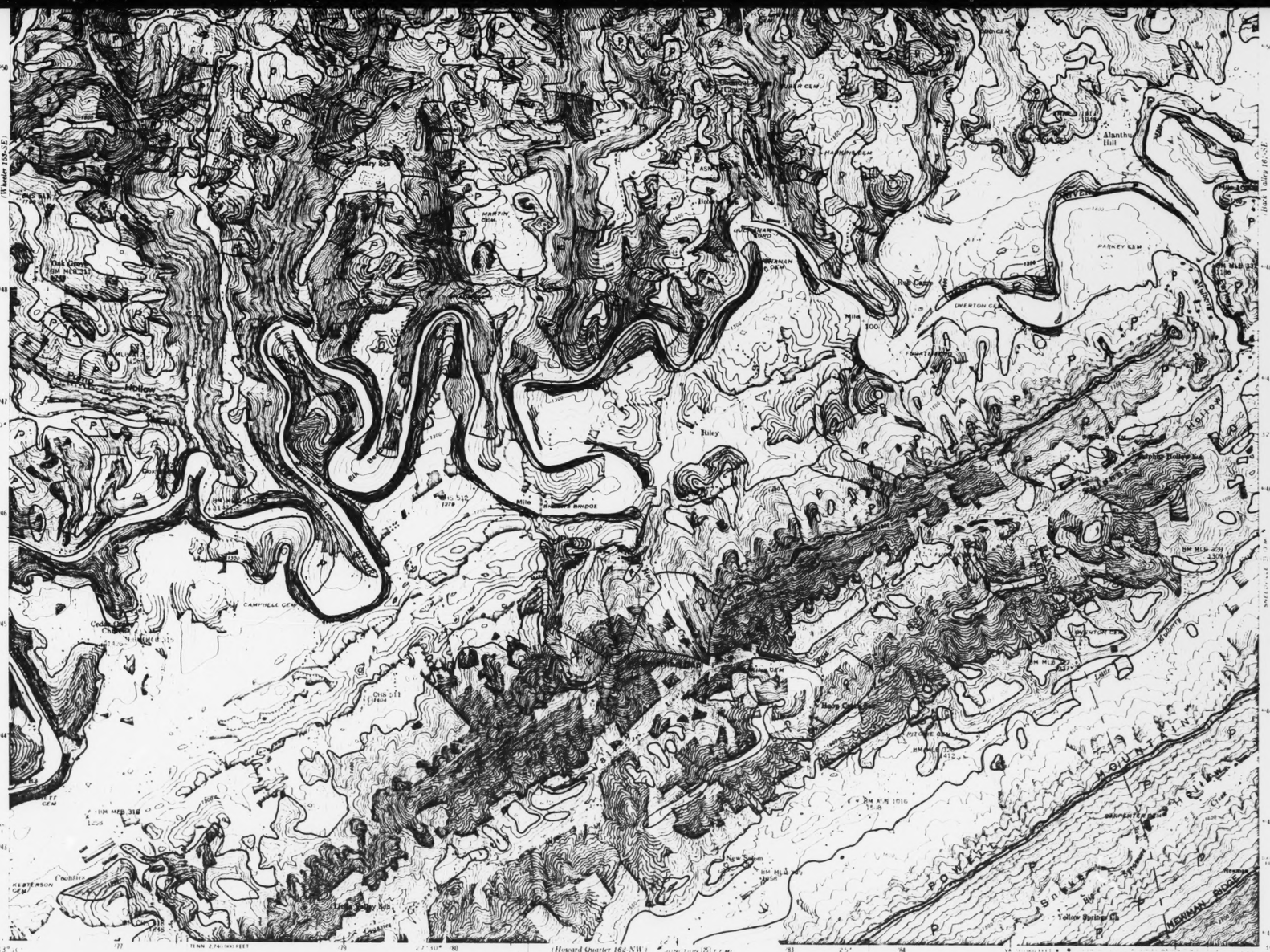

Control by USC&GS, USGS, and TVA
Topography by USGS and TVA from aerial photographs by stereophotogrammetric methods
Field examination by Tennessee Valley Authority, 1946

ROUTES USUALLY TRAVELLED
HARD IMPERVIOUS SURFACES
OTHER SURFACE IMPROVEMENTS
U.S. ROUTE
STATE ROUTE

COLEMAN GAP, TENN.-VA.

1946

LANDSLIDES AND RELATED FEATURES

OF THE COLEMAN GAP, TENN.-VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(E-5)

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1:80,000 black and white 1976

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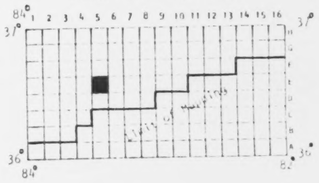
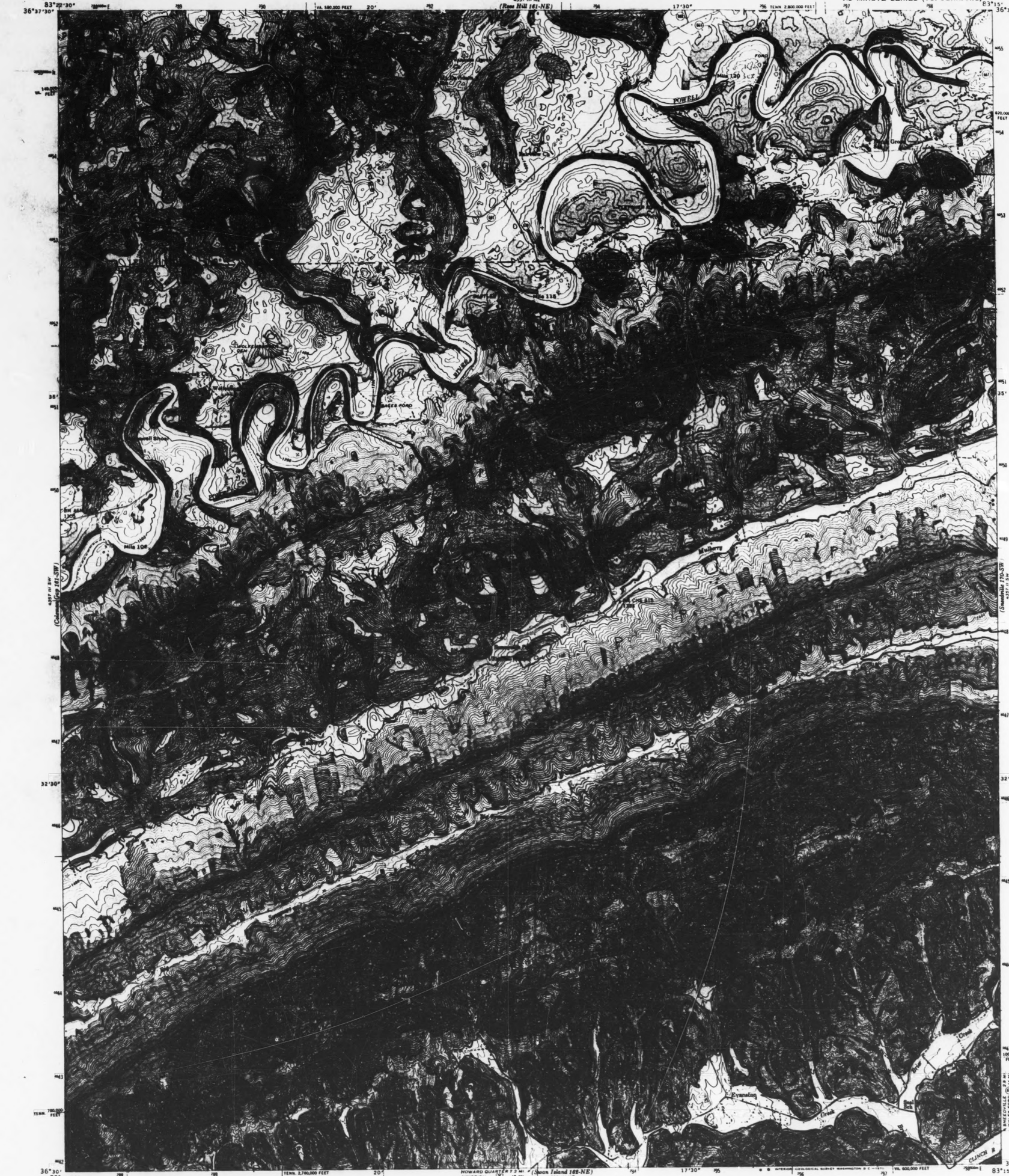
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

TENNESSEE-VIRGINIA
BACK VALLEY QUADRANGLE
161-SE
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by Tennessee Valley Authority

Control by USGS, USC&GS, and Tennessee Valley Authority

Topography by photogrammetric methods from aerial photographs. Field checked 1946

Polyconic projection. 1927 North American datum
10,000-foot grids based on Tennessee coordinate system and Virginia coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

UTM GRID AND 1982 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

Contour interval 20 feet
Datum is mean sea level

ROUTES USUALLY TRAVELED
HARD-IMPERVIOUS SURFACES
OTHER SURFACE IMPROVEMENTS
U.S. ROUTE
STATE ROUTE

BACK VALLEY, TENN.-VA.
161-SE
N3630—W8315/7.5
1946

field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE BACK VALLEY, TENN.-VA. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

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Polyconic projection. 1927 North American datum
10,000-foot grids based on Tennessee coordinate system and Virginia coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

SCALE 1:24000

Contour interval 20 feet
Datum is mean sea level

UTM GRID AND 1969 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

TENNESSEE
QUADRANGLE LOCATION

ROUTES USUALLY TRAVELLED
HARD IMPERVIOUS SURFACE
OTHER SURFACE IMPROVEMENTS
(25) U.S. ROUTE (11) STATE ROUTE

BACK VALLEY, TENN.-VA.

161-SE

N3630—W8315/7.5

1946

PHOTOREVISED 1968

field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE BACK VALLEY, TENN.-VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (E-6)

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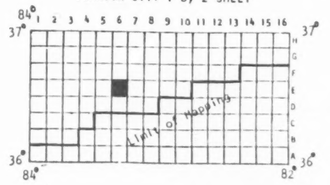

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

TENNESSEE-VIRGINIA
SNEEDVILLE QUADRANGLE
170-SW
7.5 MINUTE SERIES (TOPOGRAPHIC)

Control by USC&GS, USGS, and TVA
Topography by USGS and TVA from aerial photographs by stereophotogrammetric methods
Field examination by Tennessee Valley Authority, 1946

1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1960 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Polyconic projection. 1927 North American datum
10,000 foot grid based on Tennessee and Virginia (South) rectangular coordinate systems

ROUTES USUALLY TRAVELED
HARD, IMPERVIOUS SURFACES
OTHER SURFACE IMPROVEMENTS
U.S. ROUTE
STATE ROUTE

TENNESSEE
QUADRANGLE LOCATION

SNEEDVILLE, TENN.-VA.
170-SW
N3630-W8307 5/7.5
1946
PHOTOREVISED 1969

field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE SNEEDVILLE, TENN.-VA. QUADRANGLE

by
William F. Outerbridge

1982
U.S. Geological Survey
OPEN FILE MAP 82-0422(E-7)

NOTE

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one

Control by USC&GS, USGS, and TVA
Topography by USGS and TVA from aerial photographs by stereophotogrammetric methods
Field examination by Tennessee Valley Authority, 1946

1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

(Lee Valley 171-NW)

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

Polyconic projection. 1927 North American datum
10,000 foot grid based on Tennessee and Virginia (South) rectangular coordinate systems

ROUTES USUALLY TRAVELED
HARD, IMPERVIOUS SURFACES
OTHER SURFACE IMPROVEMENTS
U.S. ROUTE
STATE ROUTE

UTH GRID AND 1980 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

TENNESSEE
QUADRANGLE LOCATION

SNEEDVILLE, TENN.-VA.

170-SW

N3630-W8307.5/7.5

1946

PHOTOREVISED 1969

field check 1980-1981

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1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(E-7)

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Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

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Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol a designates historical debris flow or debris avalanche.

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Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

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- g — site of gravel pit

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- af — earth flow in fill
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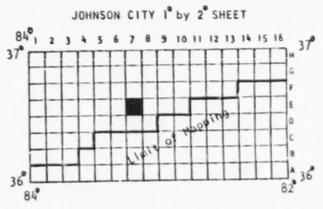
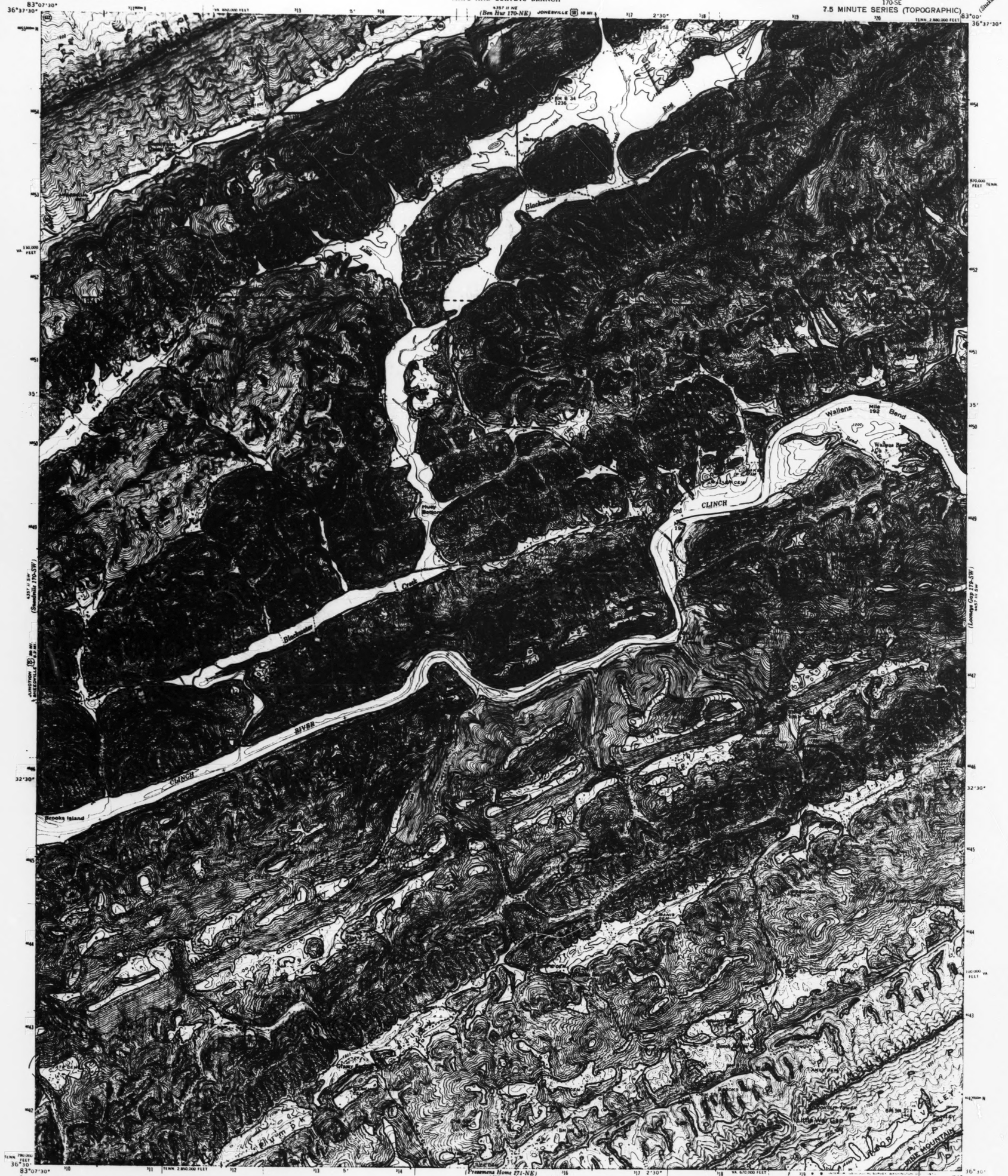
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

TENNESSEE-VIRGINIA
KYLES FORD QUADRANGLE
170-SE
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by Tennessee Valley Authority

Control by USGS, USC&GS, and Tennessee Valley Authority

Topography by photogrammetric methods from aerial photographs. Field checked 1947

Polyconic projection. 1927 North American datum
10,000 foot grids based on Tennessee coordinate system and Virginia coordinate system, south zone
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UTM GRID AND 1980 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

Heavy duty ——— Light duty
Medium duty — — — Unimproved dirt
State Route

KYLES FORD, TENN.-VA.
170 SE
1947
N3630—W8300/7.5
PHOTOREVISED 1969

LANDSLIDES AND RELATED FEATURES

OF THE KYLES FORD, TENN.-VA. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (E-8)

Field check 1980-1981

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Medium duty — Unimproved dirt
( ) State Route

TENNESSEE
QUADRANGLE LOCATION

KYLES FORD, TENN.-VA.
170 SE
1947
N3630—W8300/7.5
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LANDSLIDES AND RELATED FEATURES

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William F. Outerbridge

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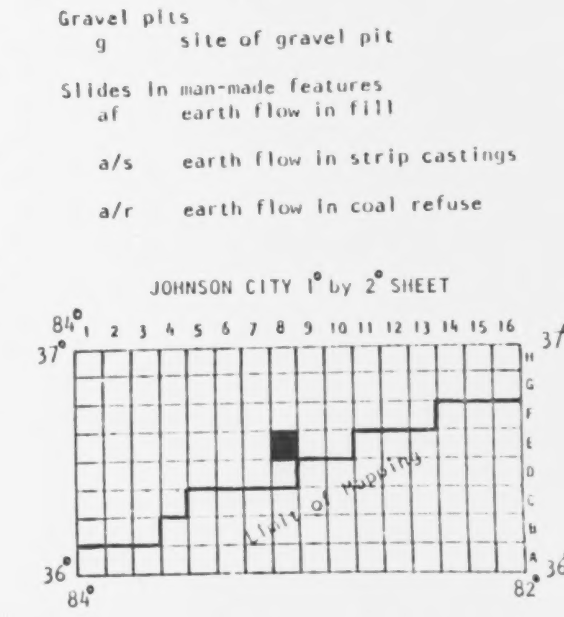

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAP AND SURVEYS BRANCH

LOONEYS GAP QUADRANGLE
TENNESSEE-VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by Tennessee Valley Authority

Control by USGS, USC&GS, and Tennessee Valley Authority

Topography by photogrammetric methods from aerial photographs taken in 1947

Polyconic projection. 1927 North American datum

10,000-foot grid based on Tennessee coordinate system and 1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

UTM GRID AND 1980 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

Medium duty — — — Light duty
Unimproved dirt
State Route

LOONEYS GAP, TENN.-VA.
1947

field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE LOONEYS GAP, TENN.-VA. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(E-9)

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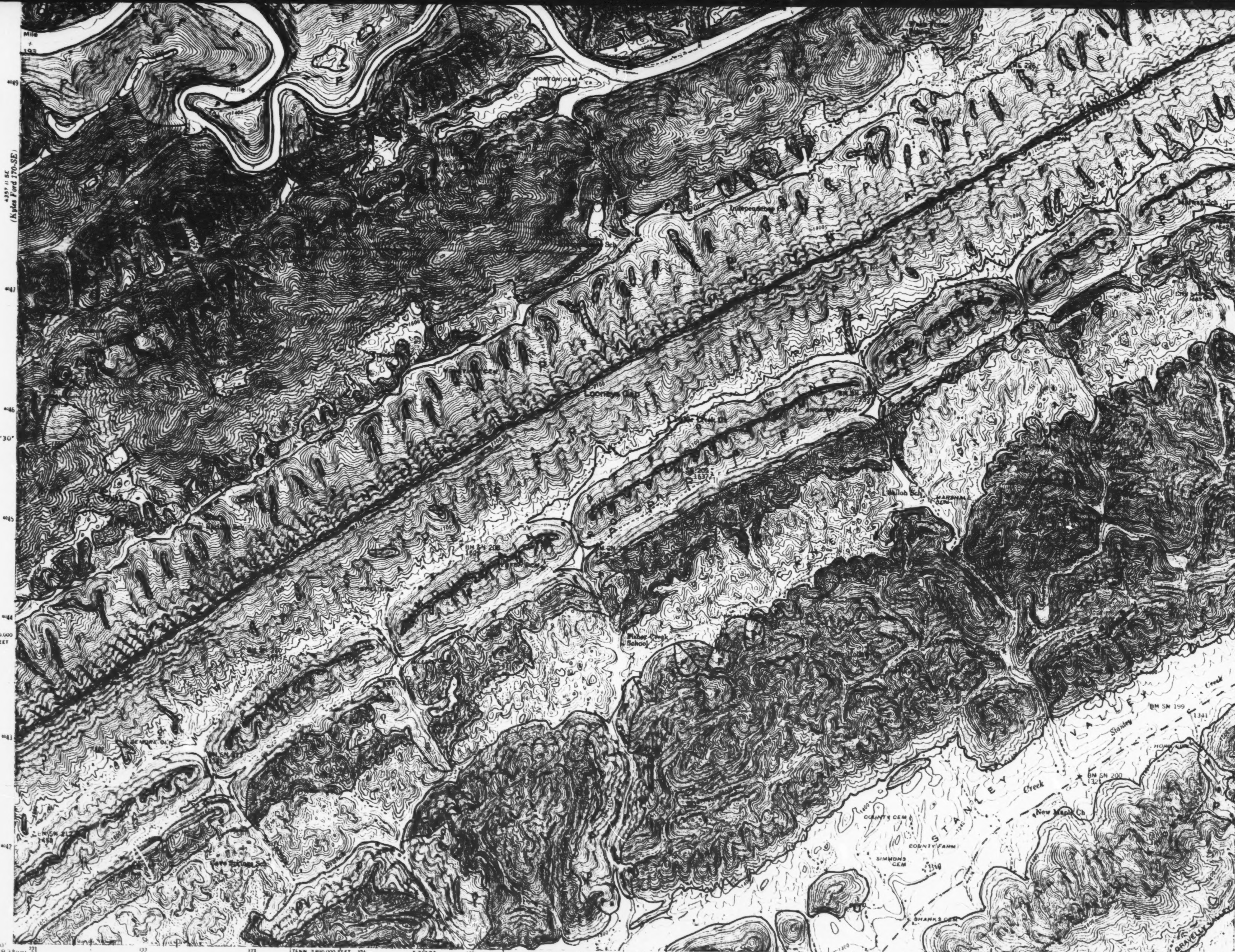

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UTM GRID AND 1947 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
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ROAD CLASSIFICATION

Medium duty — — — Light duty

Unimproved dirt

State Route

LOONEYS GAP, TENN. – VA.

N3630 – W8252.5/7.5

1947

LANDSLIDES AND RELATED FEATURES

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by

William F. Outerbridge

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U.S. Geological Survey

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field check 1980-1981

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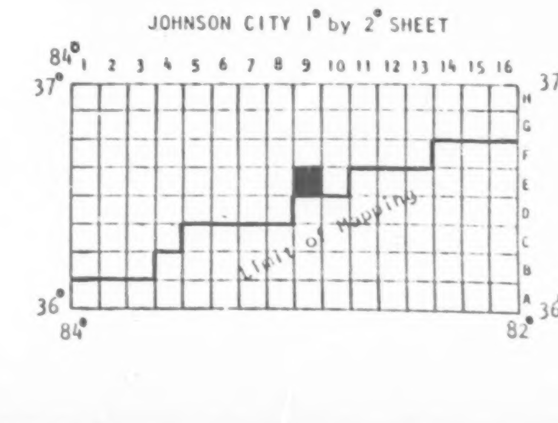

UNITED STATES
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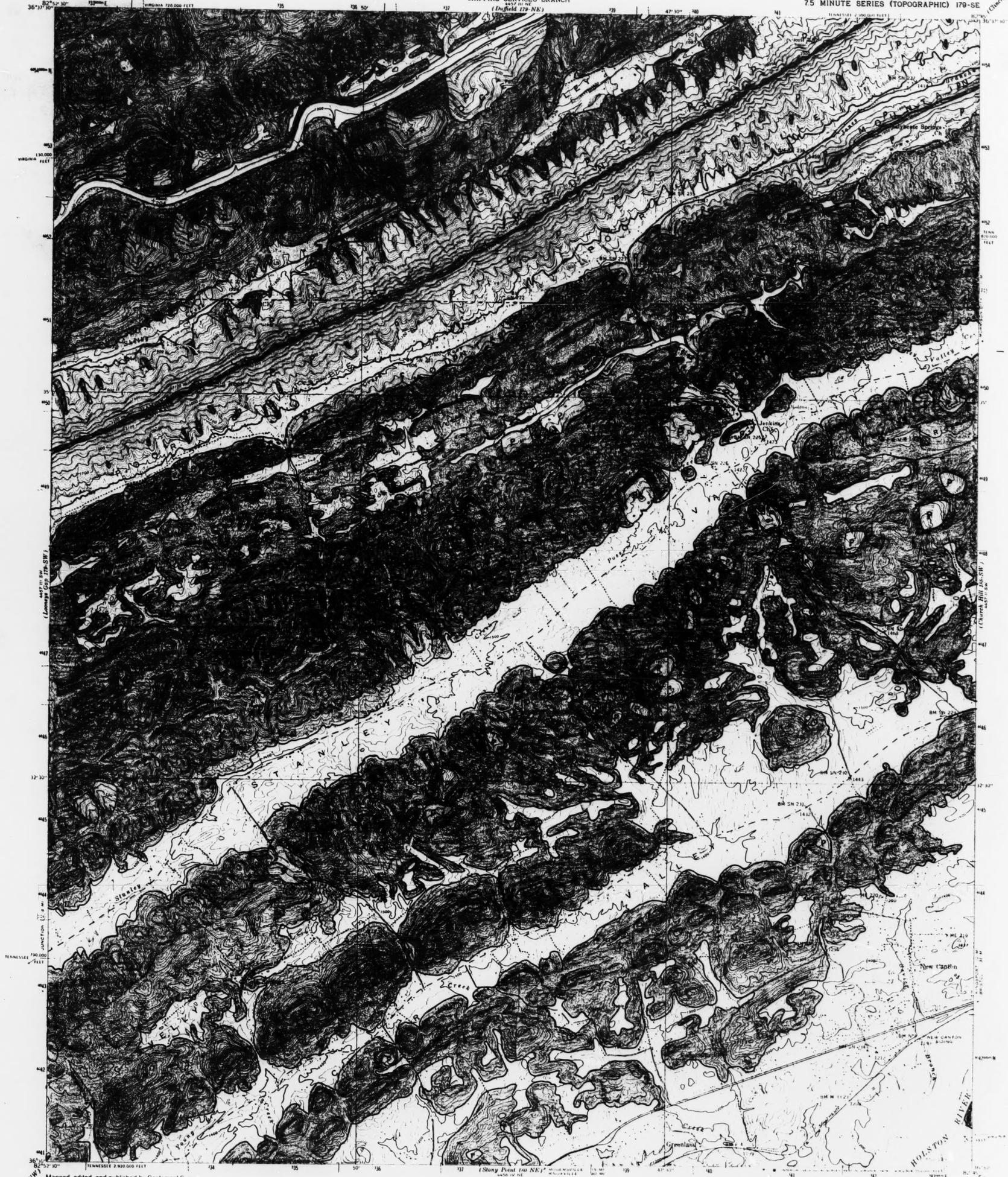
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

PLUM GROVE QUADRANGLE
TENNESSEE-VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC) 179-SE



Mapped, edited, and published by Geological Survey

Control by NOS/NOAA, USGS, and TVA

Topography by USGS by photogrammetric methods
Map field checked by TVA, 1939

Polyconic projection 1927 North American datum
10,000 foot grid based on Tennessee and
Virginia (South) rectangular coordinate systems
1000 meter Universal Transverse Mercator grid ticks
Zone 17, shown in blue

SCALE 1:24000

CONTOUR INTERVAL 20 FEET

ROAD CLASSIFICATION

Heavy duty — Poor motor road
Medium duty — Wagon and jeep track
Light duty — Foot trail
U.S. Route — State Route
In developed areas, only through roads are classified

PLUM GROVE, TENN - VA

1939

Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE PLUM GROVE, TENN.-VA. QUADRANGLE

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U.S. Geological Survey

OPEN FILE MAP 82-0422(E-10)

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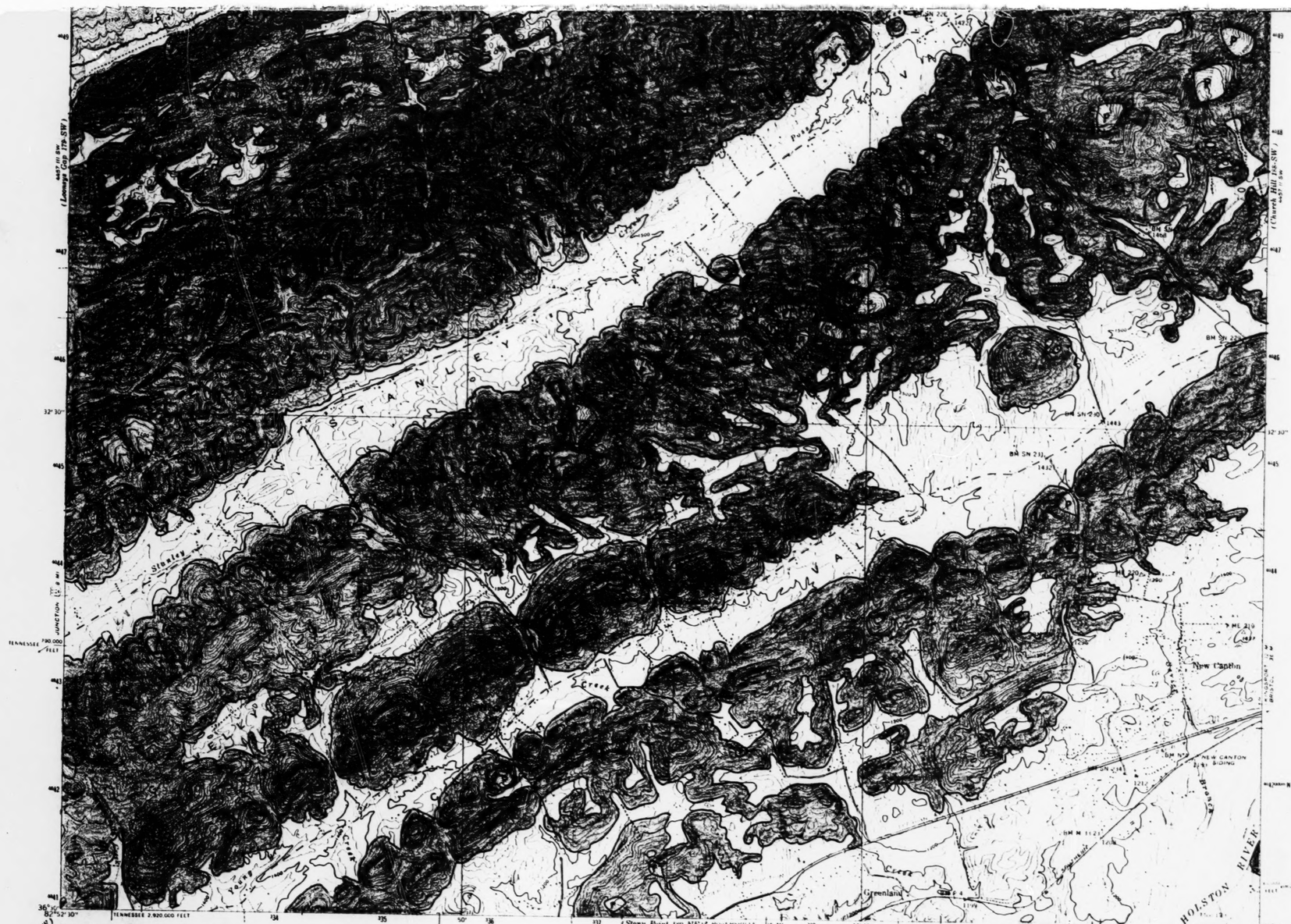

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Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

The first six digits of the open file number designate the specific 1:250,000 scale map sheet of which this quadrangle is a part. The last two digits designate the position of the quadrangle in a subdivision of the 1:250,000 scale map based on rows and tiers shown in the diagram to the right. The location of this quadrangle is shown by the black square.

MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

- sh — bench with high wall
- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

Coal refuse banks

- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries

- q — quarry site
- qub — spoil bank, quarry waste

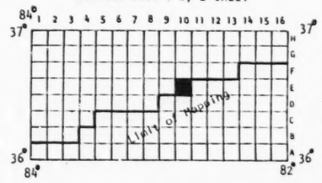
Gravel pits

- g — site of gravel pit

Slides in man-made features

- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
AGRICULTURAL AND INDUSTRIAL DEVELOPMENT BOARD

FRAKES QUADRANGLE
KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

Control by USC&GS and TVA

Topography from aerial photographs by multiplex methods
Aerial photographs taken 1951. Field check 1952

Polyconic projection. 1927 North American datum
10 000 foot grid based on Kentucky coordinate system, south zone
1000 meter Universal Transverse Mercator grid ticks

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

Heavy duty ——— Light duty
Medium duty – – – Unimproved dirt
U.S. Route State Route

UTM GRID AND 1952 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

FRAKES, KY.
NW 4 PONTE 15' QUADRANGLE
N 36°45'/W 83°00'/7.5'

1952

LANDSLIDES AND RELATED FEATURES

OF THE FRAKES, KY. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (F-1)

field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Data on landslides and strip mines in part from Newell, W.L., 1975, Geologic Map of the Frakes quadrangle and part of the Eagan quadrangle, southeastern Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1249, scale 1:24000.

ACTIVE OR RECENTLY ACTIVE LANDSLIDE

NOTE

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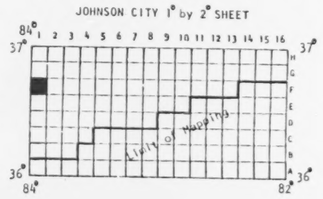
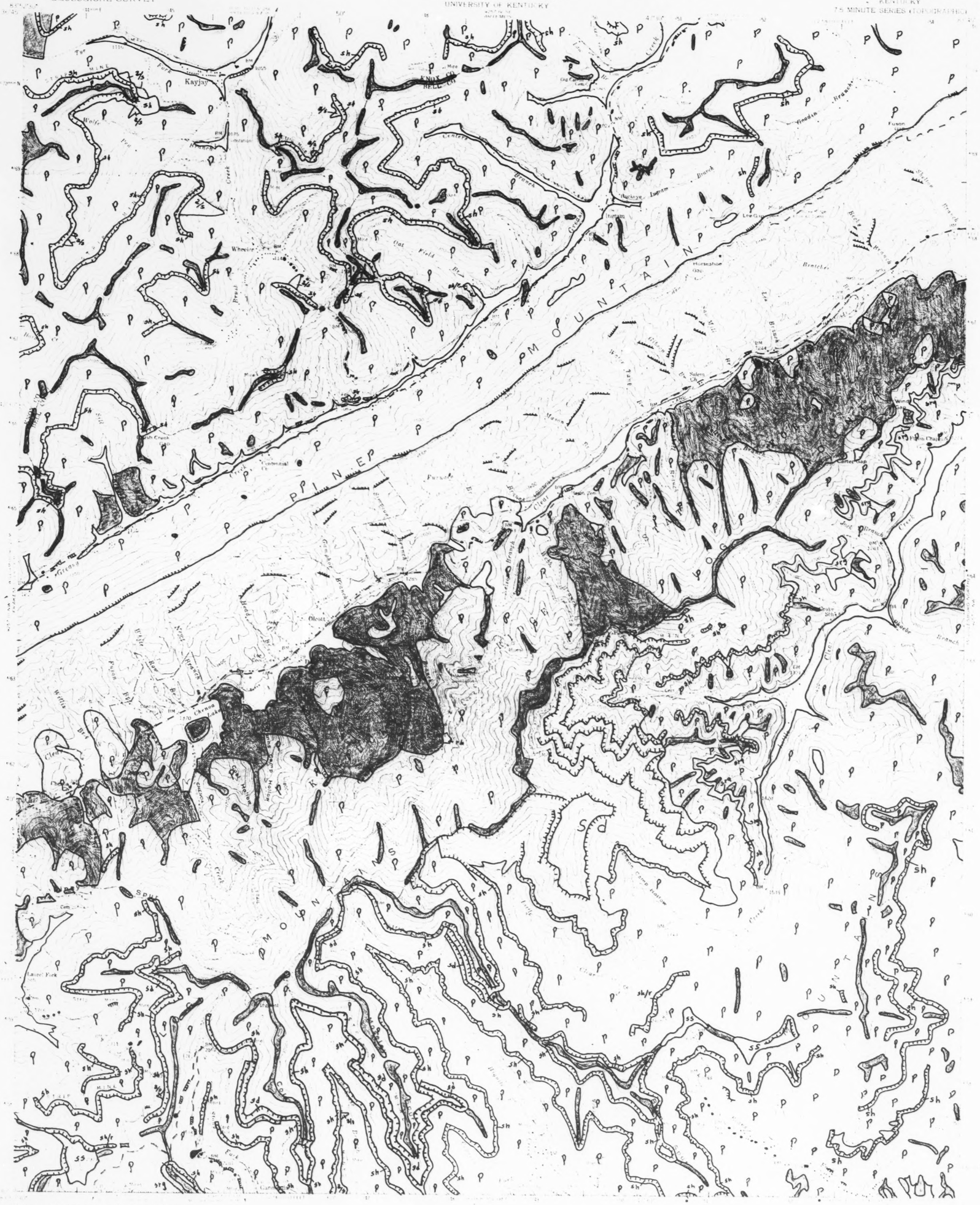
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
KENTUCKY GEOLOGICAL SURVEY
UNIVERSITY OF KENTUCKY

KAYJAY QUADRANGLE
KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC)



LANDSLIDES AND RELATED FEATURES

OF THE KAYJAY, KY. QUADRANGLE

by

William E. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(F-2)

field check 1980-1981

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Data on landslides and strip mines in part from Rice, C.L. and Haughan, E.K., 1978, Geologic map of the Kay jay quadrangle and part of the

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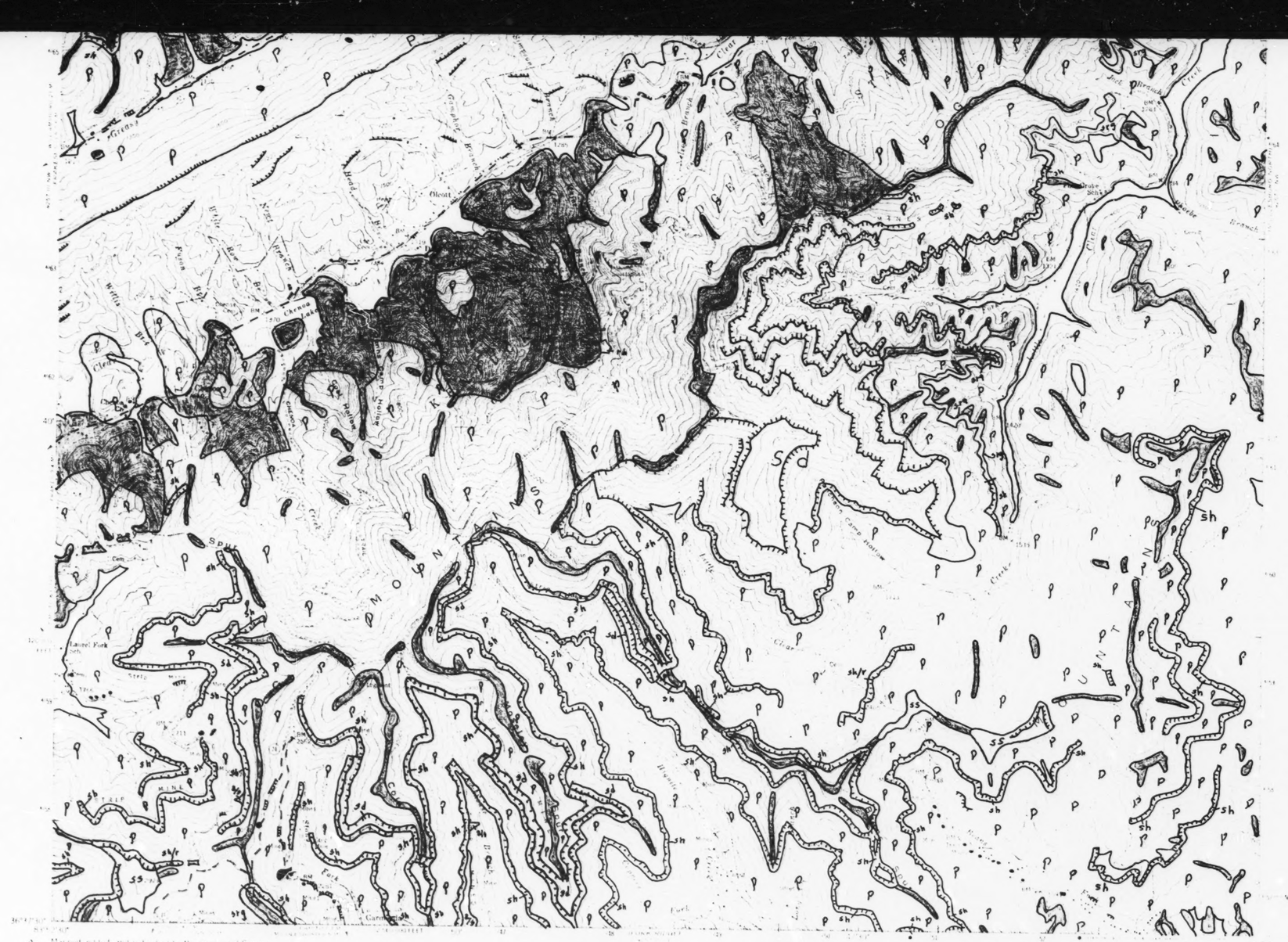

LANDSLIDES AND RELATED FEATURES

OF THE KAYJAY, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(F-2)

field check 1980-1981

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Data on landslides and strip mines in part from Rice, C.L. and Maughan, E.K., 1978, Geologic map of the Kay jay quadrangle and part of the Fork Ridge quadrangle, Bell and Knox Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1505, scale 1:24000.

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Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

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Gravel pits

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- af earth flow in fill
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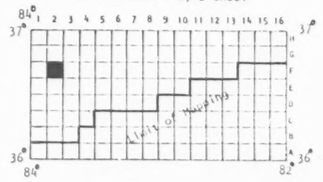
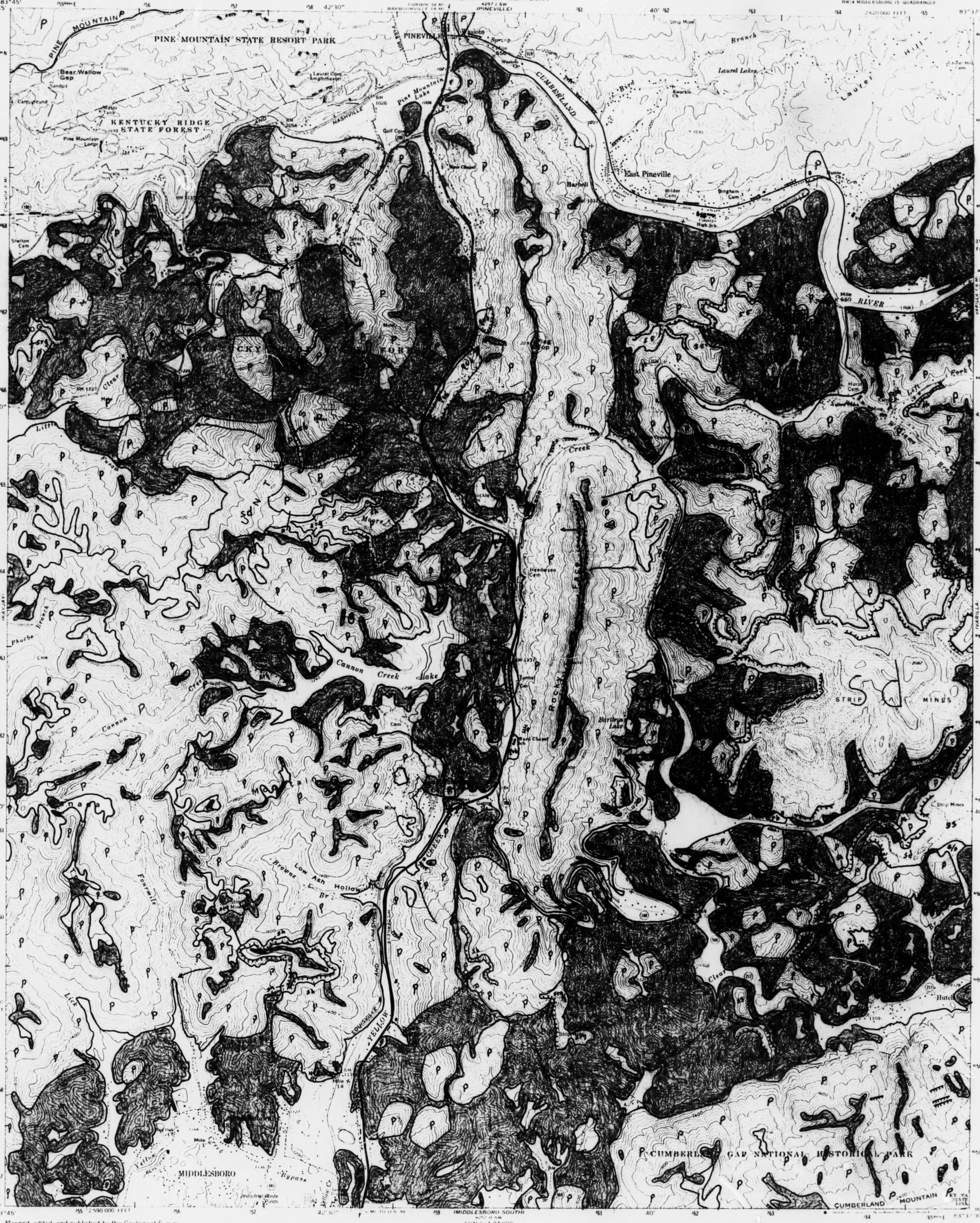
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
KENTUCKY GEOLOGICAL SURVEY
UNIVERSITY OF KENTUCKY

MIDDLESBORO NORTH QUADRANGLE
KENTUCKY – BELL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 MIDDLESBORO 15' QUADRANGLE



Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1952. Field checked 1954. Revised from aerial photographs taken 1973. Field checked 1974

Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U.S. Route — State Route

KENTUCKY
QUADRANGLE LOCATION

MIDDLESBORO NORTH, KY.
NW/4 MIDDLESBORO 15' QUADRANGLE
N3637.5—W8337.5/7.5

1974

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Data on landslides and strip mines in part from Englund, K. J., Roen, J. B., and DeLaney, A. O., 1964, Geology of the Middlesboro North Quadrangle, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-300.

LANDSLIDES AND RELATED FEATURES

OF THE MIDDLESBORO NORTH, KY. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (F-3)

NOTE

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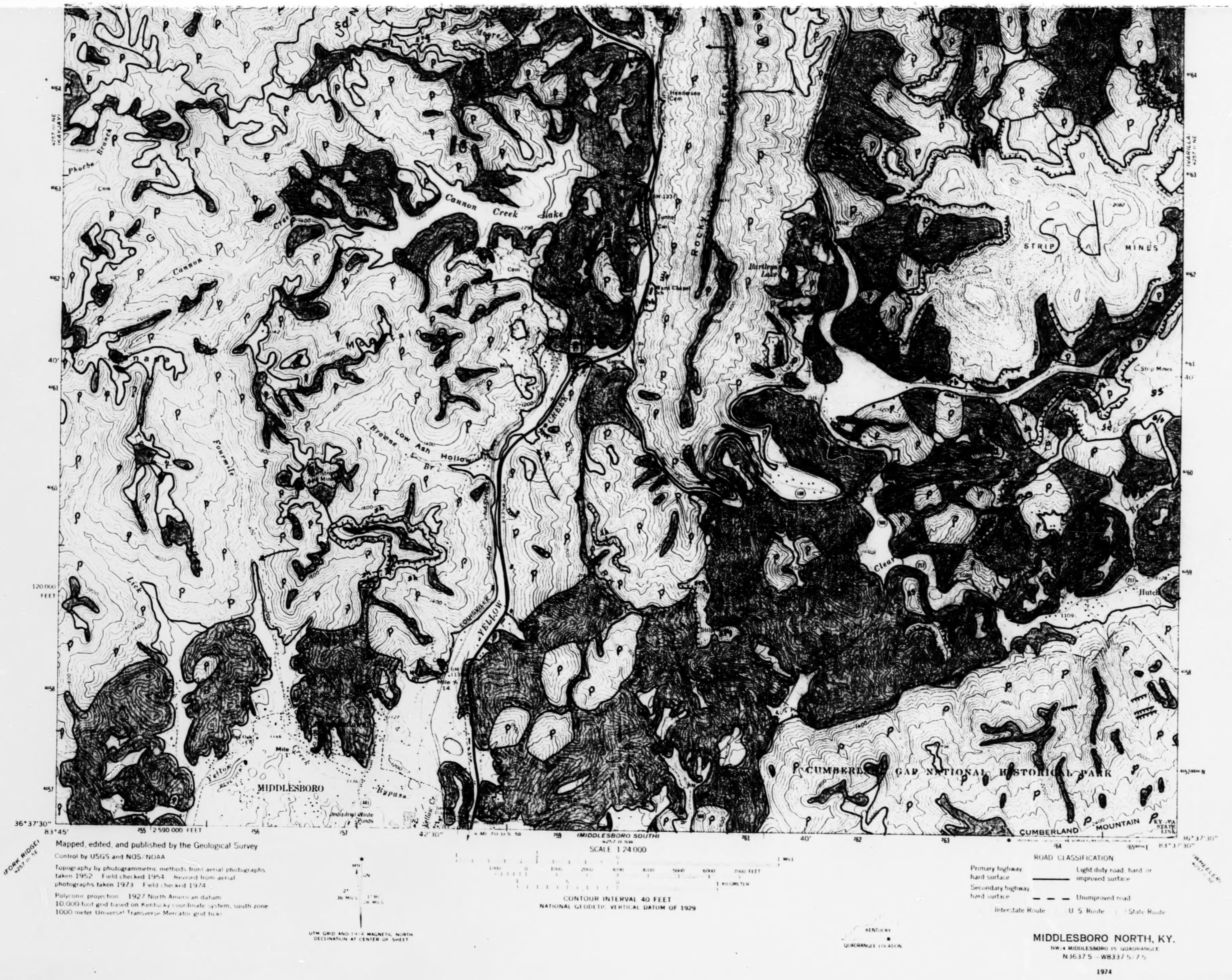

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LANDSLIDES AND RELATED FEATURES

OF THE MIDDLESBORO NORTH, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(F-3)

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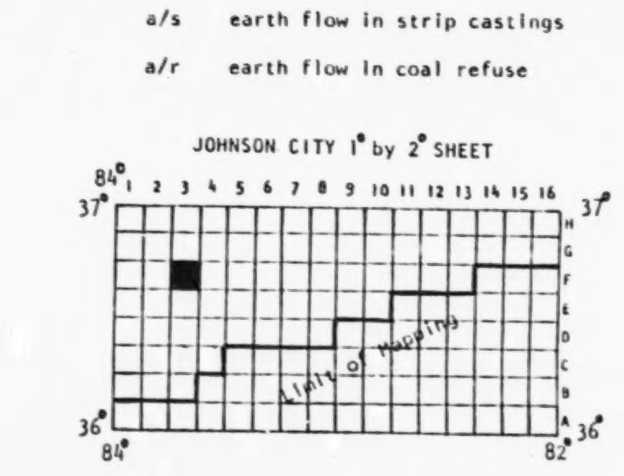

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
KENTUCKY GEOLOGICAL SURVEY
UNIVERSITY OF KENTUCKY

VARILLA QUADRANGLE
KENTUCKY-VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey
Control by USGS and NOS/NOAA
Topography by photogrammetric methods from aerial photographs taken 1961. Field checked 1964. Revised from aerial photographs taken 1973. Field checked 1974
Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system, south zone, and Virginia coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks

VARILLA, KY.-VA.

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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Data on landslides and strip mines in part from Englund, K. J., Landis, E. R., and Smith, H. L., 1963, Geology of the Varilla Quadrangle, Kentucky - Virginia:

LANDSLIDES AND RELATED FEATURES

OF THE VARILLA, KY.-VA. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(E-4)

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Data on landslides and strip mines in part from Englund, K. J., Landis, E. R., and Smith, H. L., 1963, geology of the Varilla Quadrangle, Kentucky - Virginia: U. S. Geological Survey Geologic Quadrangle Map GQ-190, scale 1:24,000.

LANDSLIDES AND RELATED FEATURES

OF THE VARILLA, KY.-VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(F-4)

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AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES

Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol ▲ designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL

Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING

Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES

Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

- sh — bench with high wall
- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

Coal refuse banks

- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries

- q — quarry site
- qub — spoil bank, quarry waste

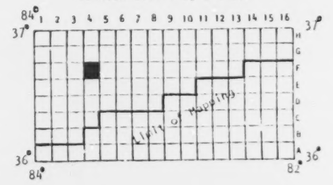
Gravel pits

- g — site of gravel pit

Slides in man-made features

- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

EWING QUADRANGLE
KENTUCKY-VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC) 161-NW

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey
Control by TVA and USC&GS
Topography by photogrammetric methods from aerial photographs by TVA
Aerial photographs taken 1946
Land classification compilation by TVA
Boundaries surveyed in cooperation with the States of Kentucky and Tennessee
Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 16
Fine dashed lines indicate selected fields and section lines
Land lines not surveyed

Heavy duty
Medium duty
Light duty
Unimproved dirt
State Route

EWING, KY.-VA.
1946

Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Data on landslides and strip mines in part from Englund, K. J., Smith, H. L., Harris, L. D., and Stephens, J. G., 1961, Geology of the Ewing Quadrangle,

LANDSLIDES AND RELATED FEATURES

OF THE EWING, KY.-VA. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(F-5)

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Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

(Coleman Gap 161-SW)

EWING, KY.-VA.

1946

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OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

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- qub spoil bank, quarry waste

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- g site of gravel pit

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- af earth flow in fill
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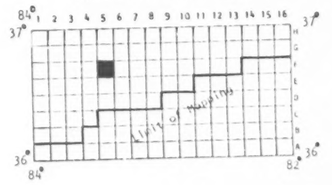

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

ROSE HILL QUADRANGLE
VIRGINIA-KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC) 861-NE

ROSE HILL, VA.-KY.

LANDSLIDES AND RELATED FEATURES

OF THE ROSE HILL, VA.-KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

field check 1980-1981

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Data on landslides and strip mines in part from Maughan, E.K. and Tazelaar, F., 1973,

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ROSE HILL VA.-KY.

LANDSLIDES AND RELATED FEATURES

OF THE ROSE HILL, VA.-KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (F-6)

field check 1980-1981

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Data on landslides and strip mines in part from Maughan, E.K. and Tazelaar, F., 1973, Geologic Map of part of Rose Hill quadrangle, Harlan County, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1121, scale 1:24000.

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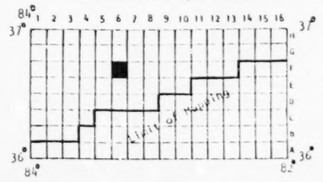
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

VIRGINIA-KENTUCKY
HUBBARD SPRINGS QUADRANGLE
7.5 MINUTE SERIES (TOPOGRAPHIC)

HUBBARD SPRINGS, VA. - KY.

LANDSLIDES AND RELATED FEATURES

OF THE HUBBARD SPRINGS, VA.-KY. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(F-7)

field check 1980-1981

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Data on landslides and strip mines in part from Tazelaar, F. and Newell, W.L., 1974, Geologic map of the Evarts quadrangle and part of the Hubbard Springs quadrangle, Southeastern Kentucky and Virginia: U.S. Geological Survey Geologic

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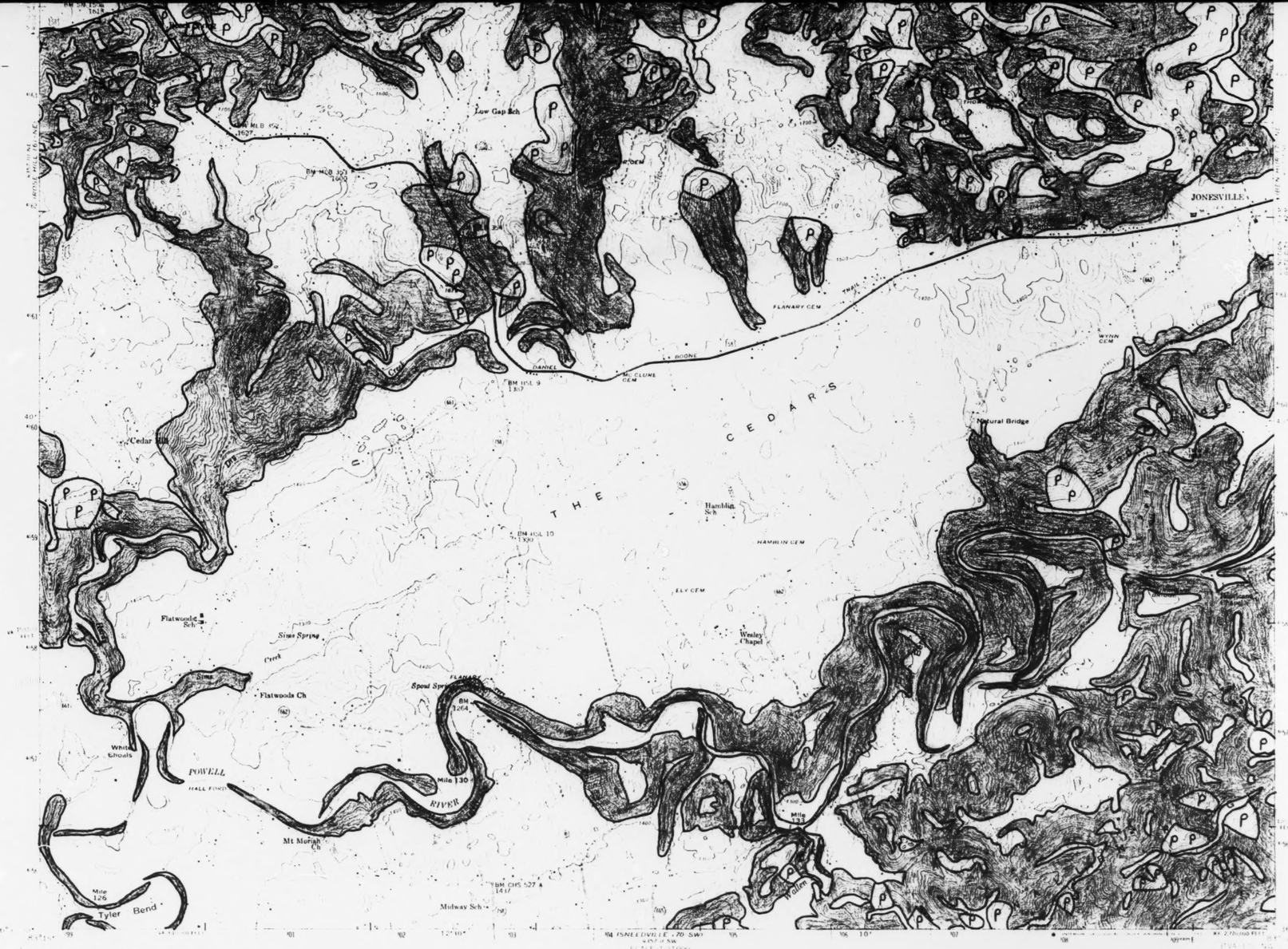

HUBBARD SPRINGS, VA.-KY.

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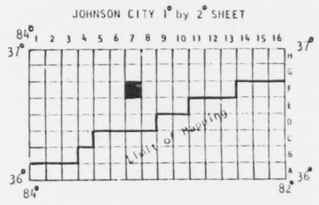

UNITED STATES
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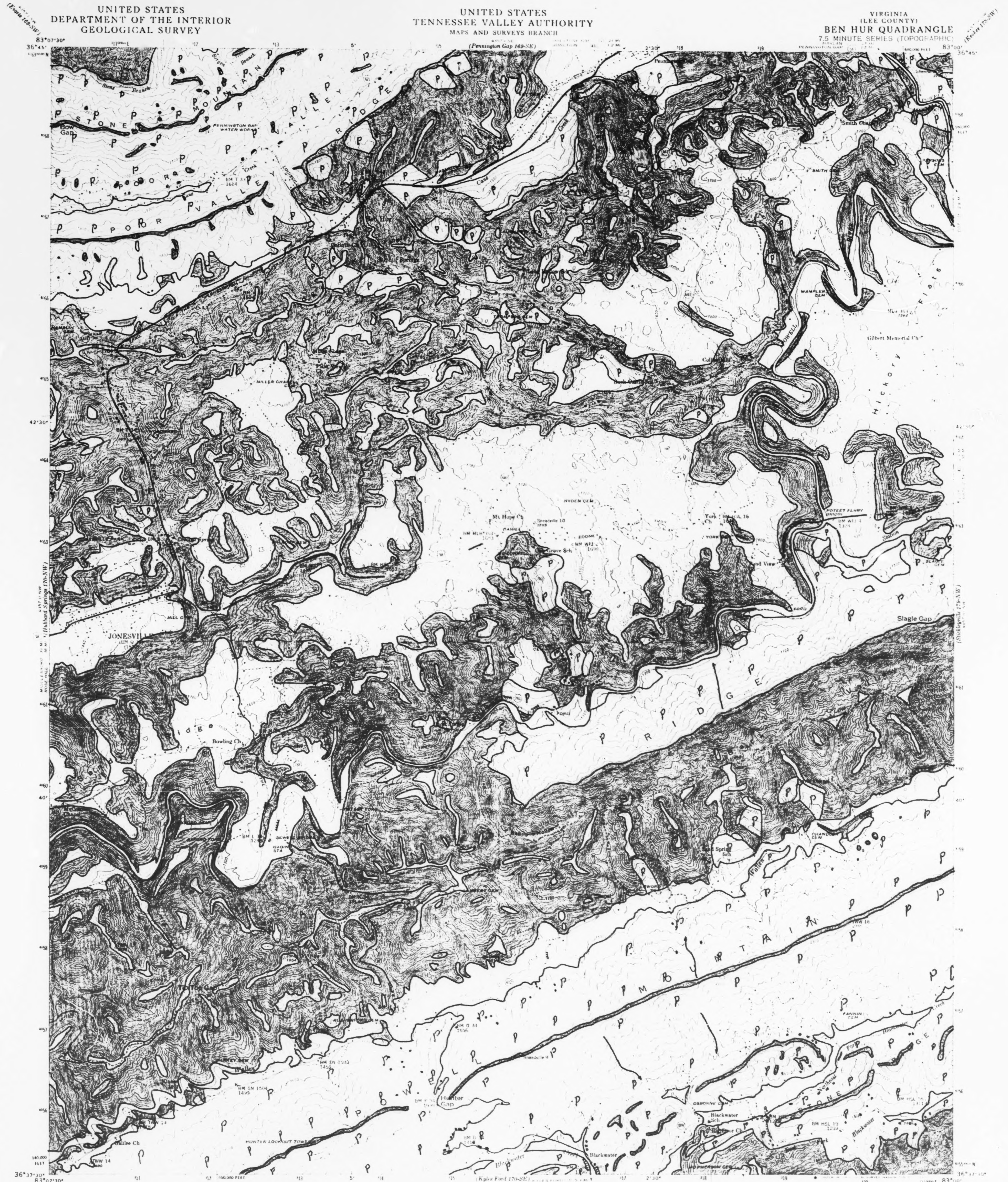
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

VIRGINIA
(LEE COUNTY)
BEN HUR QUADRANGLE
7.5 MINUTE SERIES (TOPOGRAPHIC)



Control by USC&GS, USGS, and TVA
Topography by USGS and TVA from aerial
photographs by stereophotogrammetric methods
Field examination by Tennessee Valley Authority, 1947

BEN HUR, VA.
170-NE
1947

LANDSLIDES AND RELATED FEATURES

OF THE BEN HUR, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(F-8)

field check 1980-1981

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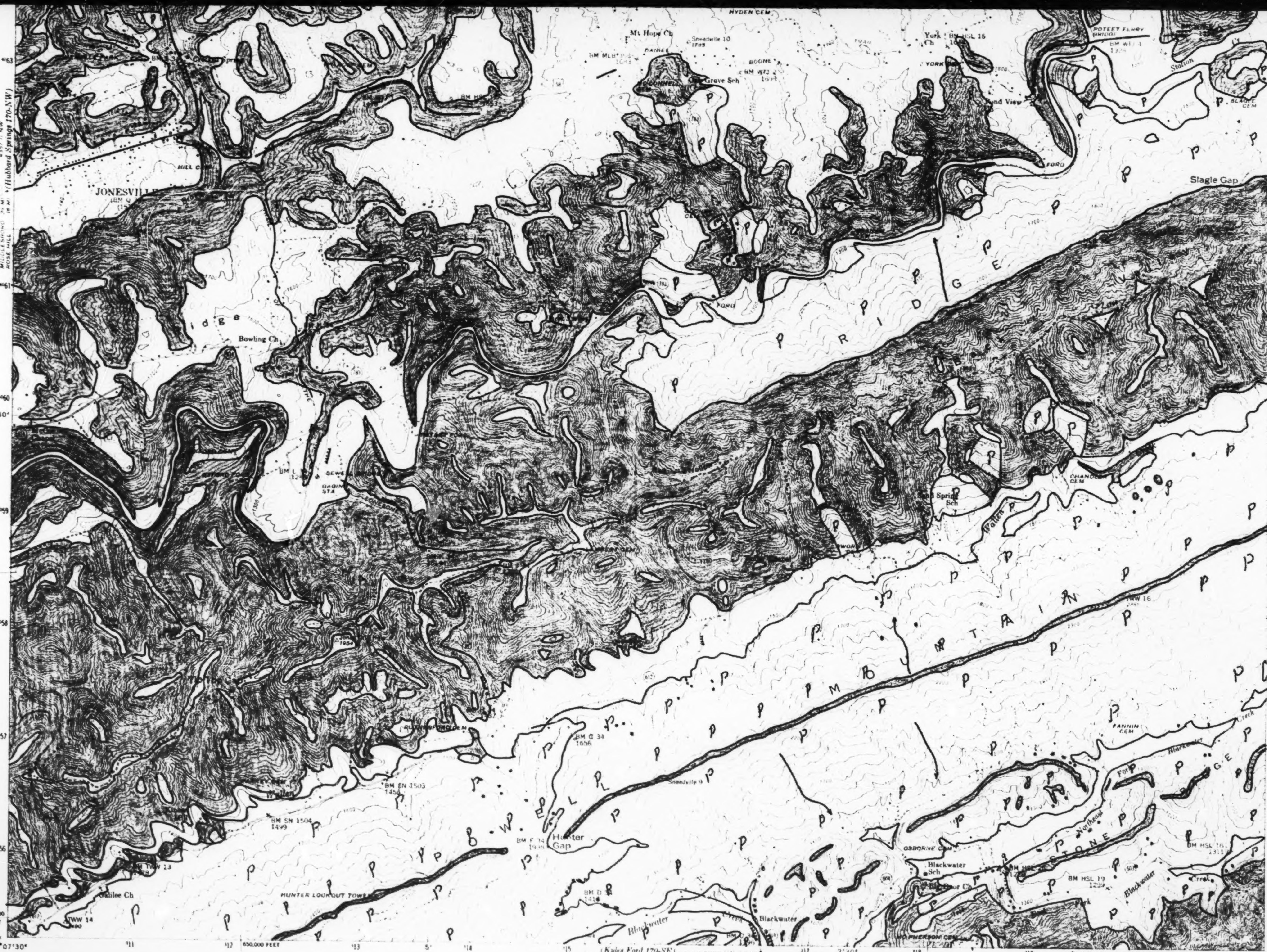

Control by USC&GS, USGS, and TVA
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Field examination by Tennessee Valley Authority, 1947

(Sneedville 170-SW)

(Looneys Gap 179-SW)

UTM GRID AND 1964 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

BEN HUR, VA.
170-NE
1947

field check 1980-1981

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Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

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sf	furrowed with high wall
sd	multiple furrows and multiple benches
ss	hilltop removed
srg	reclaimed by grading
sru	reclaimed by secondary use
sh/r	regraded in part, high wall remains

Coal refuse banks

r	identified on aerial photographs; not classified in field check
rb	not burnt nor on fire
rbb	burnt
rbd	burning
rbs	sludge

Quarries

q	quarry site
qub	spoil bank, quarry waste

Gravel pits

g	site of gravel pit

Slides in man-made features

af	earth flow in fill
a/s	earth flow in strip castings
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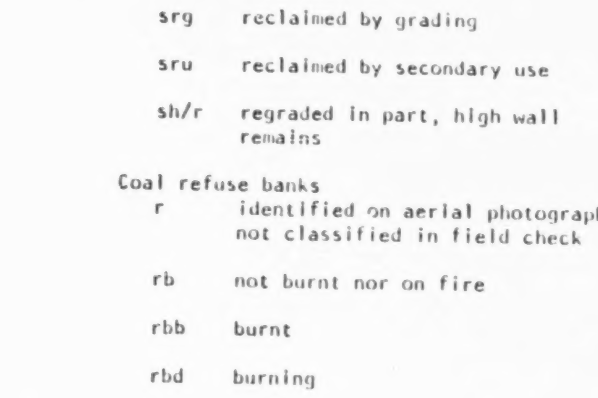
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

VIRGINIA
STICKLEYVILLE QUADRANGLE
179-NW
7.5 MINUTE SERIES (TOPOGRAPHIC)

Control by USC&GS, USGS, and TVA
Topography by USGS and TVA from aerial photographs by stereophotogrammetric methods
Field examination by Tennessee Valley Authority, 1946

Maps distributed by the Geological Survey

1000-meter Universal Transverse Mercator grid ticks,

SCALE 1:24 000

Contour interval 20 feet
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Polyconic projection. 1927 North American datum
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ROADS USUALLY TRAVELED
OTHER SURFACE IMPROVEMENTS
U.S. ROUTE
STATE ROUTE

VIRGINIA
QUADRANGLE LOCATION

STICKLEYVILLE, VA.
179-NW
N3637.5—W8252.5/7.5
1946

field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE STICKLEYVILLE, VA. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (F-9)

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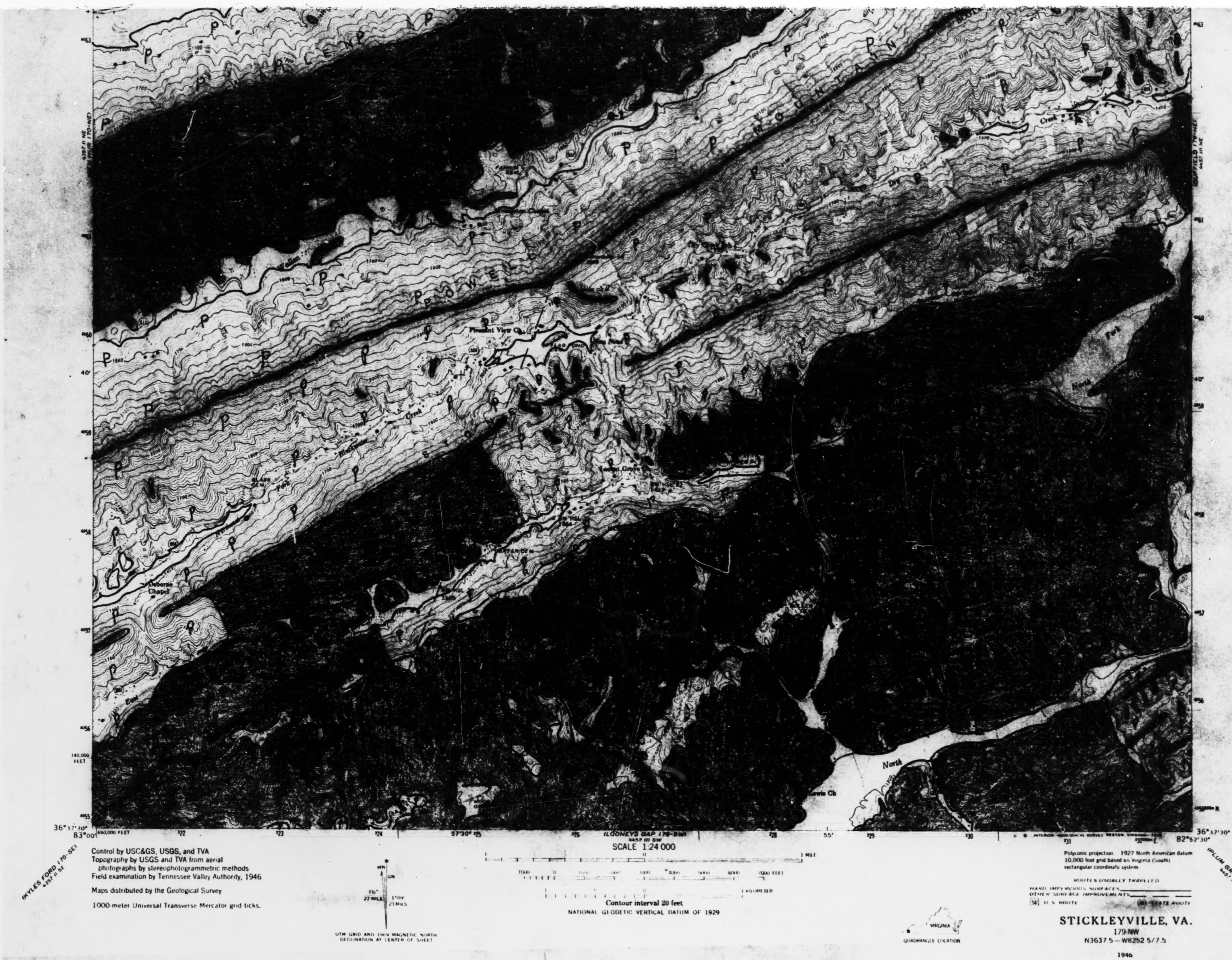

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- r — identified on aerial photographs; not classified in field check
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- q — quarry site
- qub — spoil bank, quarry waste

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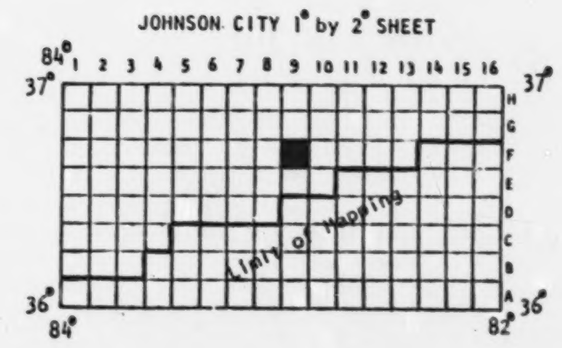

UNITED STATES
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TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

DUFFIELD QUADRANGLE
VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC) 179-NE

(Stickleyville 178-NW) (Jonesville Gap 179-NE) (Plum Grove 179-SE) (Clinchport 180-NW)

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

DUFFIELD, VA

1982

Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE DUFFIELD, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (F-10)

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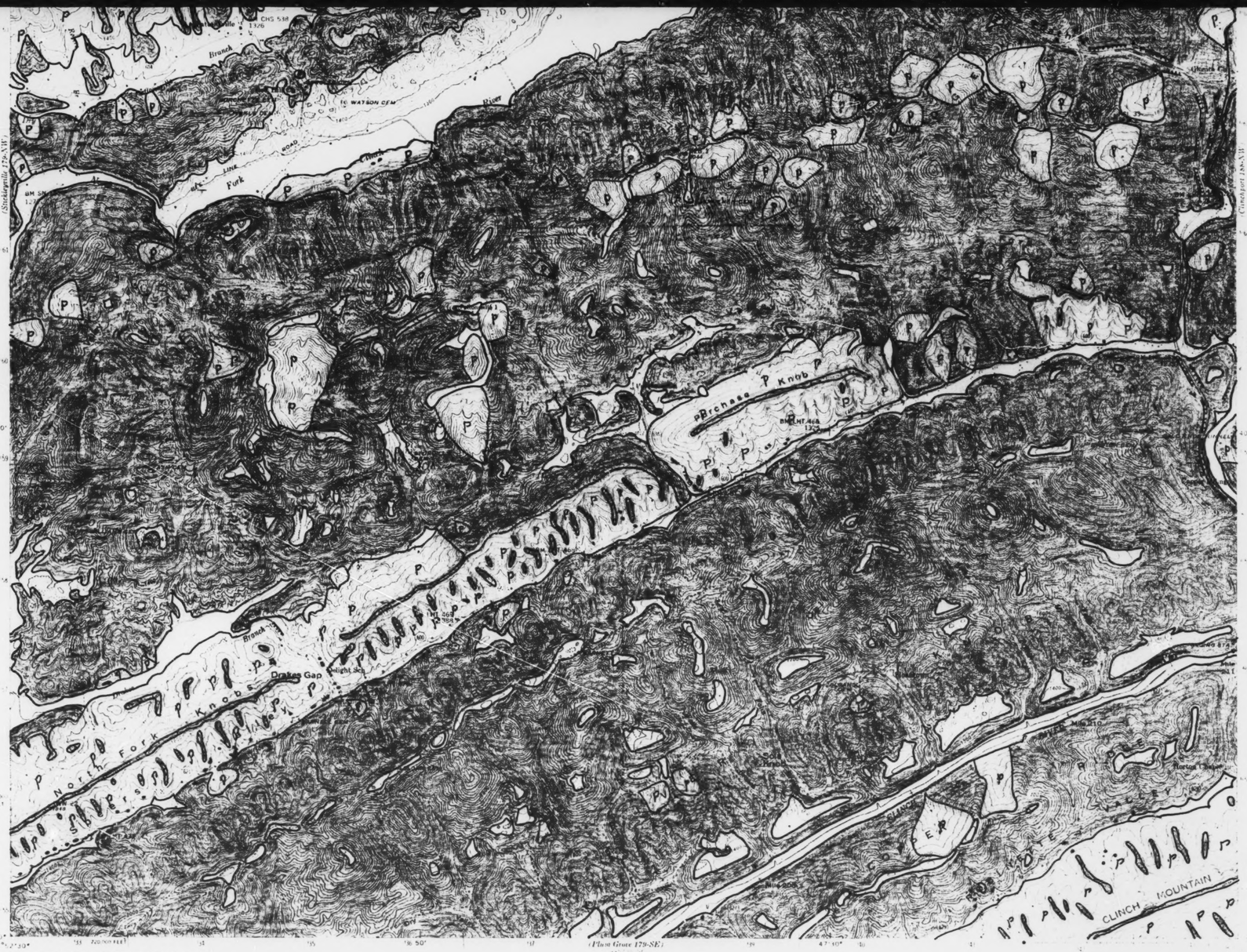

Mapped and edited by Tennessee Valley Authority

Published by the Geological Survey

SCALE 1:24000

CONTOUR INTERVAL 20 FEET

DUFFIELD, VA

1947

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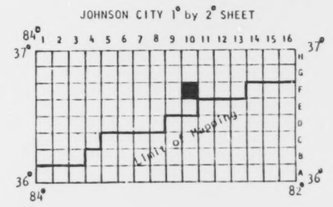

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LANDSLIDES AND RELATED FEATURES

OF THE CLINCHPORT, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (F-11)

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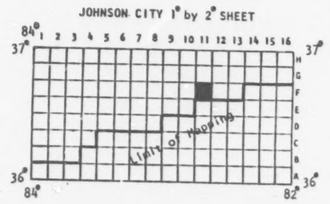

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LANDSLIDES AND RELATED FEATURES

OF THE GATE CITY, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (F-12)

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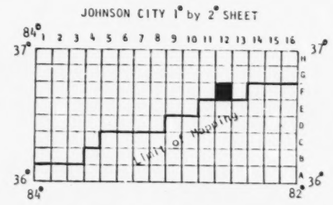

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Topography by USGS by photogrammetric methods
Map field checked by TVA, 1938

Projection (projection) 1927 North American datum
10,000-foot grid based on Virginia (South)
zone coordinate system
1000-meter Universal Transverse Mercator grid ticks

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Heavy duty
Medium duty
Light duty

HILTON, VA.
N3637.5—W8215/7.5
1938

field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE HILTON, VA. QUADRANGLE

by
William F. Outerbridge

1982
U.S. Geological Survey
OPEN FILE MAP 82-0422(F-13)

NOTE

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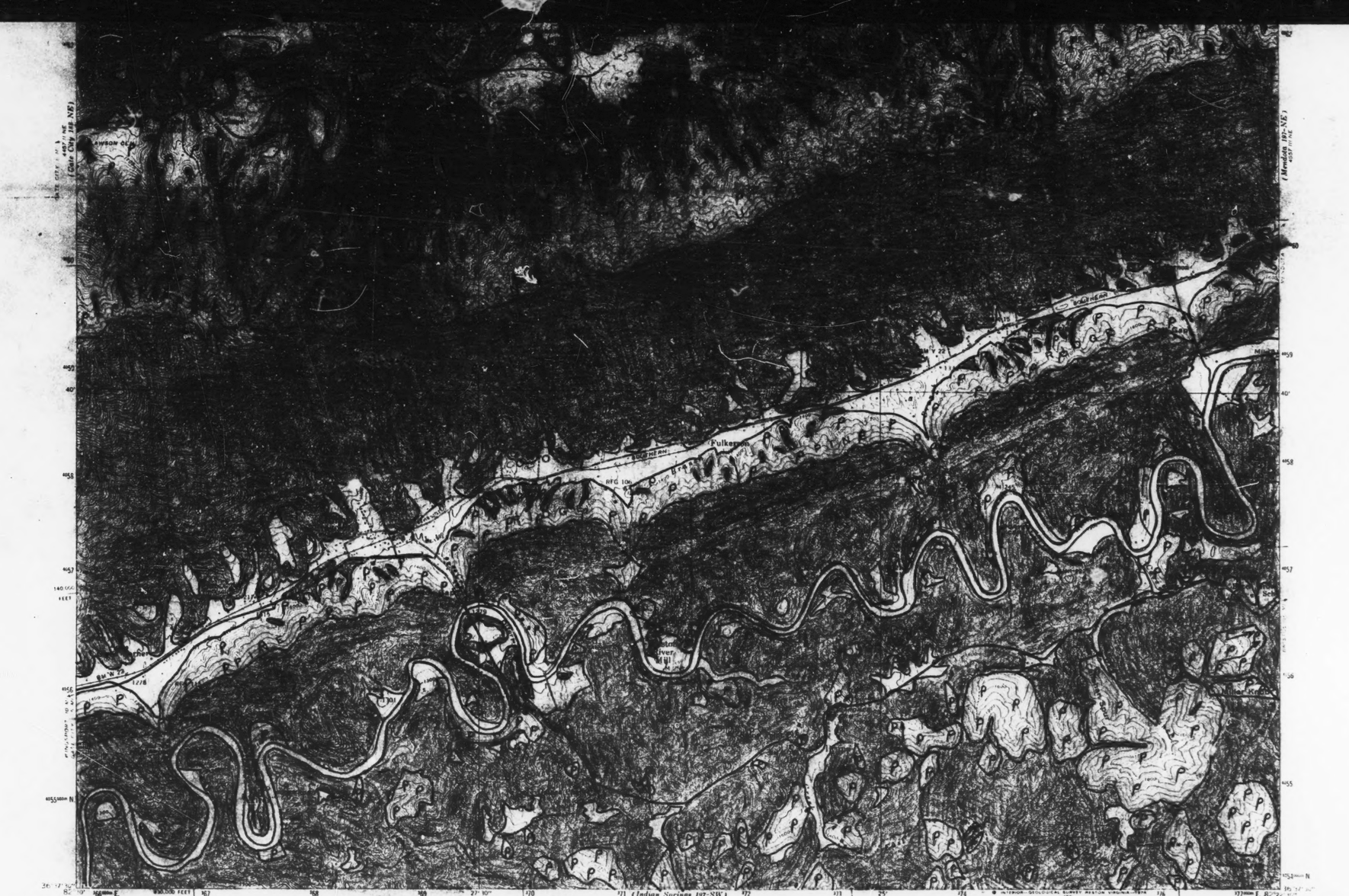

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ACTIVE OR RECENTLY ACTIVE LANDSLIDE

Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

P

OLD LANDSLIDE

Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V

COLLUVIAL SLOPE

Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES

Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol D designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL

Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

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Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

- sh bench with high wall
- sf furrowed with high wall
- sd multiple furrows and multiple benches
- ss hilltop removed
- srg reclaimed by grading
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- sh/r regraded in part, high wall remains

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- r identified on aerial photographs; not classified in field check
- rb not burnt nor on fire
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- rbd burning
- rbs sludge

Quarries

- q quarry site
- qub spoil bank, quarry waste

Gravel pits

- g site of gravel pit

Slides in man-made features

- af earth flow in fill
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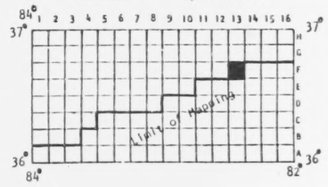
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
KENTUCKY GEOLOGICAL SURVEY
UNIVERSITY OF KENTUCKY

BARBOURVILLE QUADRANGLE
KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey
Control by USGS and NOS/NOAA
Topography by photogrammetric methods from aerial photographs taken 1951. Field checked 1952. Revised from aerial photographs taken 1973. Field checked 1974
Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system, south zone
1000-metre Universal Transverse Mercator grid ticks

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

BARBOURVILLE, KY.
1974

field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE BARBOURVILLE, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(G-1)

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Polyconic projection. 1927 North American datum
10 000-foot grid based on Kentucky coordinate system, South zone
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BARBOURVILLE, KY.

1974

Field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE BARBOURVILLE, KY. QUADRANGLE

by

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1982

U.S. Geological Survey

OPEN FILE MAP 92-0422(G-1)

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- rbd — burning
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- qub — spoil bank, quarry waste

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- af — earth flow in fill
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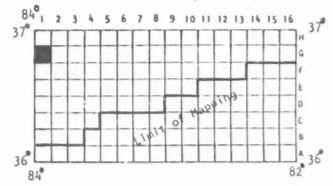
- a/r — earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
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GEOLOGICAL SURVEY

STATE OF KENTUCKY
KENTUCKY GEOLOGICAL SURVEY
UNIVERSITY OF KENTUCKY

ARTEMUS QUADRANGLE
KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 BARBOURVILLE 15' QUADRANGLE

Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1951. Field checked 1952. Revised from aerial photographs taken 1973. Field checked 1974

Polyconic projection. 1927 North American datum
10,000 foot grid based on Kentucky coordinate system, south zone
1000 metre Universal Transverse Mercator grid ticks.

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

KENTUCKY
QUADRANGLE LOCATION

ROAD CLASSIFICATION

Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U.S. Route — State Route

ARTEMUS, KY.
SE/4 BARBOURVILLE 15' QUADRANGLE
N3645—W8345/7.5
1974

Field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE ARTEMUS, KY. QUADRANGLE

by
William F. Outerbridge

1982
U.S. Geological Survey
OPEN FILE MAP 82-0422 (G-2)

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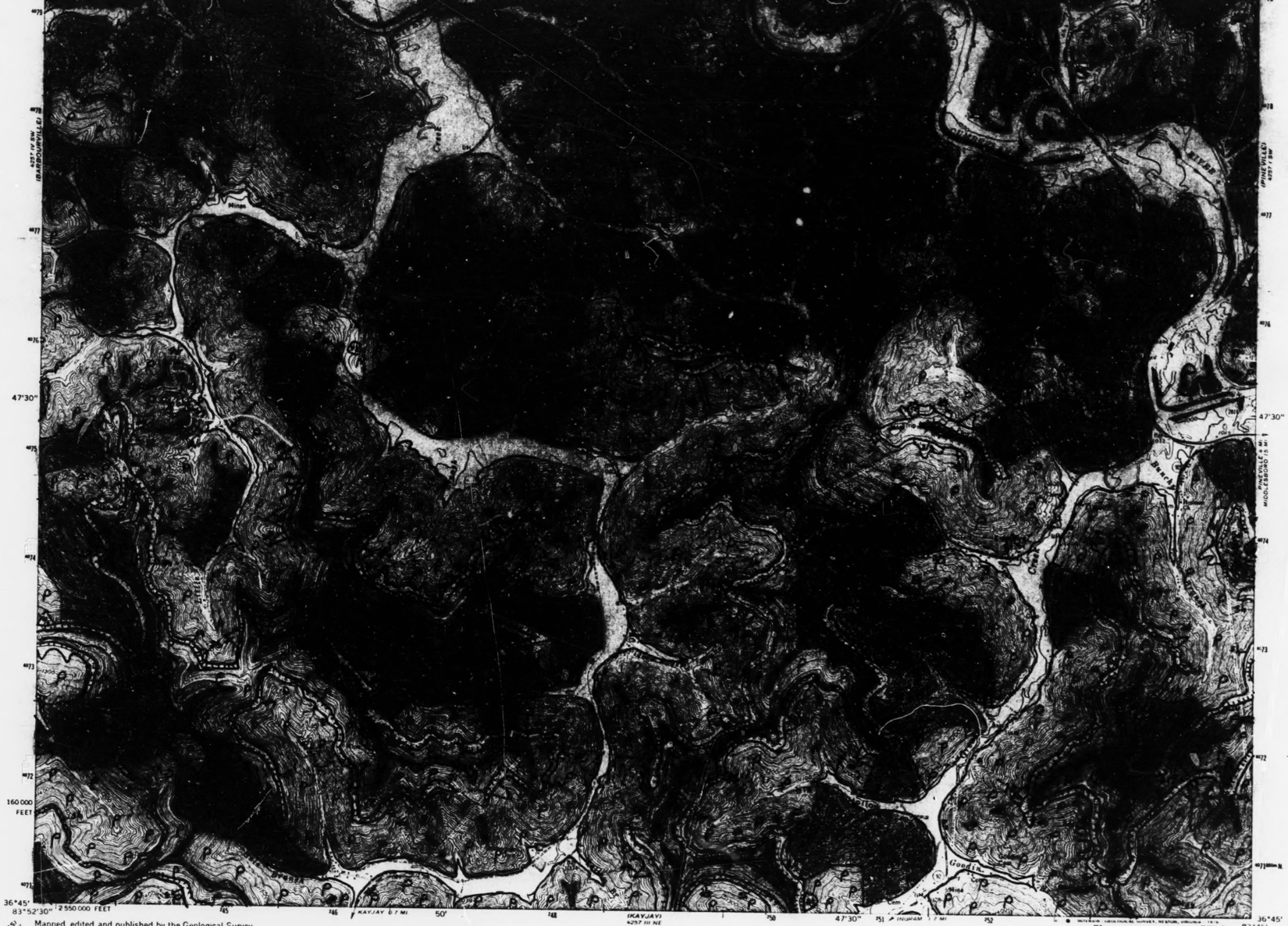
Strip mines (combination of letter symbols



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SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

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KENTUCKY
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ROAD CLASSIFICATION

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ARTEMUS, KY.

SE/4 BARBOURVILLE 15' QUADRANGLE
N3645—W8345/7.5

1974

field check 1980-1981

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OPEN FILE MAP 82-0422 (G-2)

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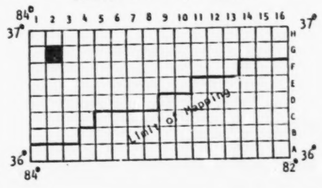

UNITED STATES
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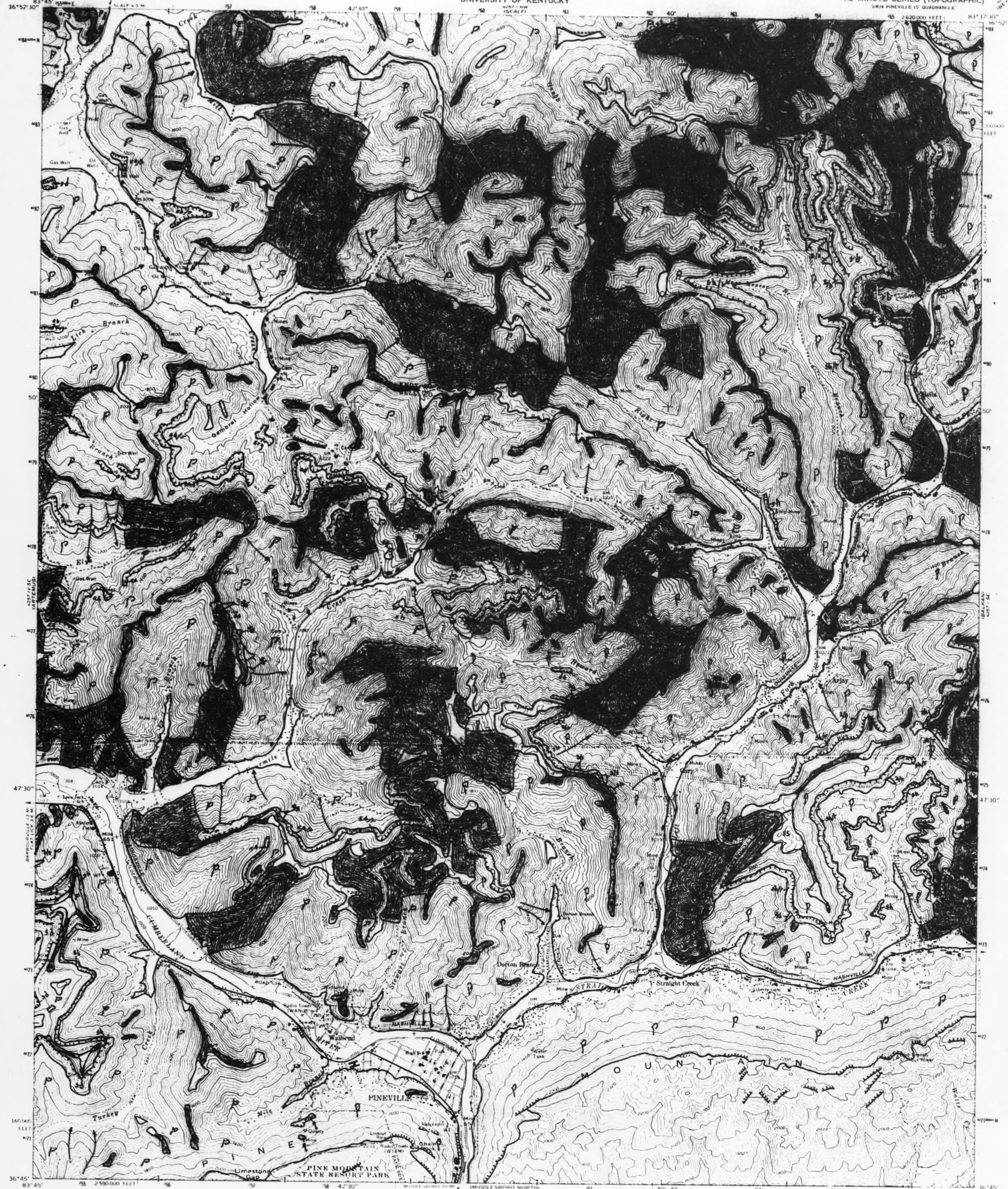
STATE OF KENTUCKY
KENTUCKY GEOLOGICAL SURVEY
UNIVERSITY OF KENTUCKY

PINEVILLE QUADRANGLE
KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 PINEVILLE 15' QUADRANGLE



Mapped, edited, and published by the Geological Survey

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10,000-foot grid based on Kentucky coordinate system, south zone
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CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Primary highway, hard surface — Light duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route · U.S. Route · State Route

PINEVILLE, KY.
SW/4 PINEVILLE 15' QUADRANGLE
N3645—W8337.5/7.5

1974

Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE PINEVILLE, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(G-3)

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UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

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PINEVILLE, KY.
SW/4 PINEVILLE 15' QUADRANGLE
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sru	reclaimed by secondary use
sh/r	regraded in part, high wall remains

Coal refuse banks

r	identified on aerial photographs; not classified in field check
rb	not burnt nor on fire
rbb	burnt
rbd	burning
rbs	sludge

Quarries

q	quarry site
qub	spoil bank, quarry waste

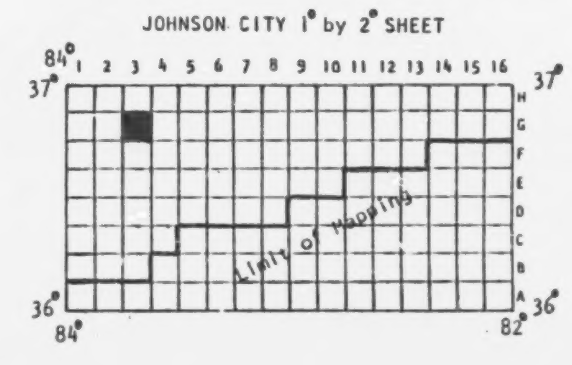
Gravel pits

g	site of gravel pit

Slides in man-made features

af	earth flow in fill
a/s	earth flow in strip castings
a/r	earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Data on landslides and strip mines in part from Froelich, A. J., and Tazelaar, J. F., 1973, Geologic map of the Balkan quadrangle, Bell and Harlan Counties, Kentucky: U. S. Geological Survey Geologic Quadrangle Map GQ-1127, scale 1:24,000.

LANDSLIDES AND RELATED FEATURES

OF THE BALKAN, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP82-0422 (G-4)

NOTE

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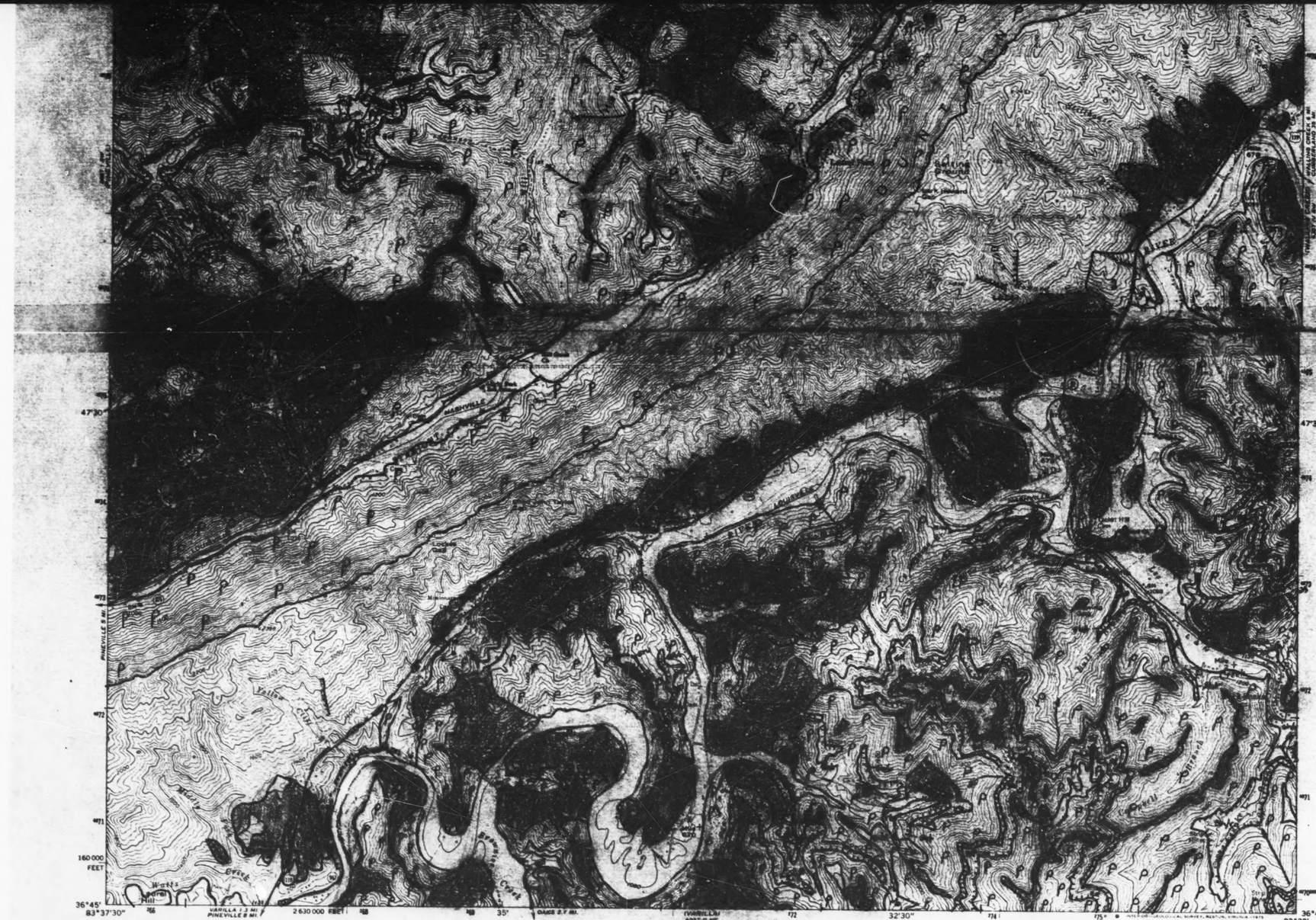
MAN-MADE FEATURES

Strip mines (combination of letter symbols



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1952. Field checked 1954. Revised from aerial photographs taken 1973. Field checked 1974

Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system, south zone
1000-metre Universal Transverse Mercator grid ticks, zone 17, shown in blue.

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route U S Route State Route

QUADRANGLE LOCATION

BALKAN, KY.

SE/4 PINEVILLE 15' QUADRANGLE
N3645—W8330/7.5

1974

Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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Data on landslides and strip mines in part from Froelich, A. J., and Tazelaar, J. F., 1973, Geologic map of the Balkan quadrangle, Bell and Harlan Counties, Kentucky: U. S. Geological Survey Geologic Quadrangle Map GQ-1127, scale 1:24,000.

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Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

P — OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V — COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

LANDSLIDES AND RELATED FEATURES

OF THE BALKAN, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP82-0422 (G-4)

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol D designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

The first six digits of the open file number designate the specific 1:250,000 scale map sheet of which this quadrangle is a part. The last two digits designate the position of the quadrangle in a subdivision of the 1:250,000 scale map based on rows and tiers shown in the diagram to the right. The location of this quadrangle is shown by the black square.

NOTE

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

- sh — bench with high wall
- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

Coal refuse banks

- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries

- q — quarry site
- qub — spoil bank, quarry waste

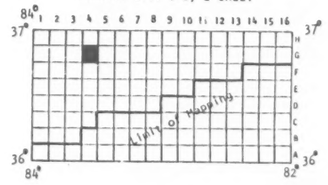
Gravel pits

- g — site of gravel pit

Slides in man-made features

- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
KENTUCKY GEOLOGICAL SURVEY
UNIVERSITY OF KENTUCKY

WALLINS CREEK QUADRANGLE
KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1952. Field checked 1954. Revised from aerial photographs taken 1973. Field checked 1974

Polyconic projection. 1927 North American datum
10,000 foot grid based on Kentucky coordinate system, south zone
1000 metre Universal Transverse Mercator grid ticks

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION

Primary highway, hard surface — Light duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U.S. Route — State Route

WALLINS CREEK, KY.

1974

Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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Data on landslides and strip mines in part from Froelich, A.J., 1972, Geologic map of the Wallins Creek quadrangle, Harlan and Bell Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1016, scale 1:24000.

LANDSLIDES AND RELATED FEATURES

OF THE WALLINS CREEK, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(G-S)

NOTE

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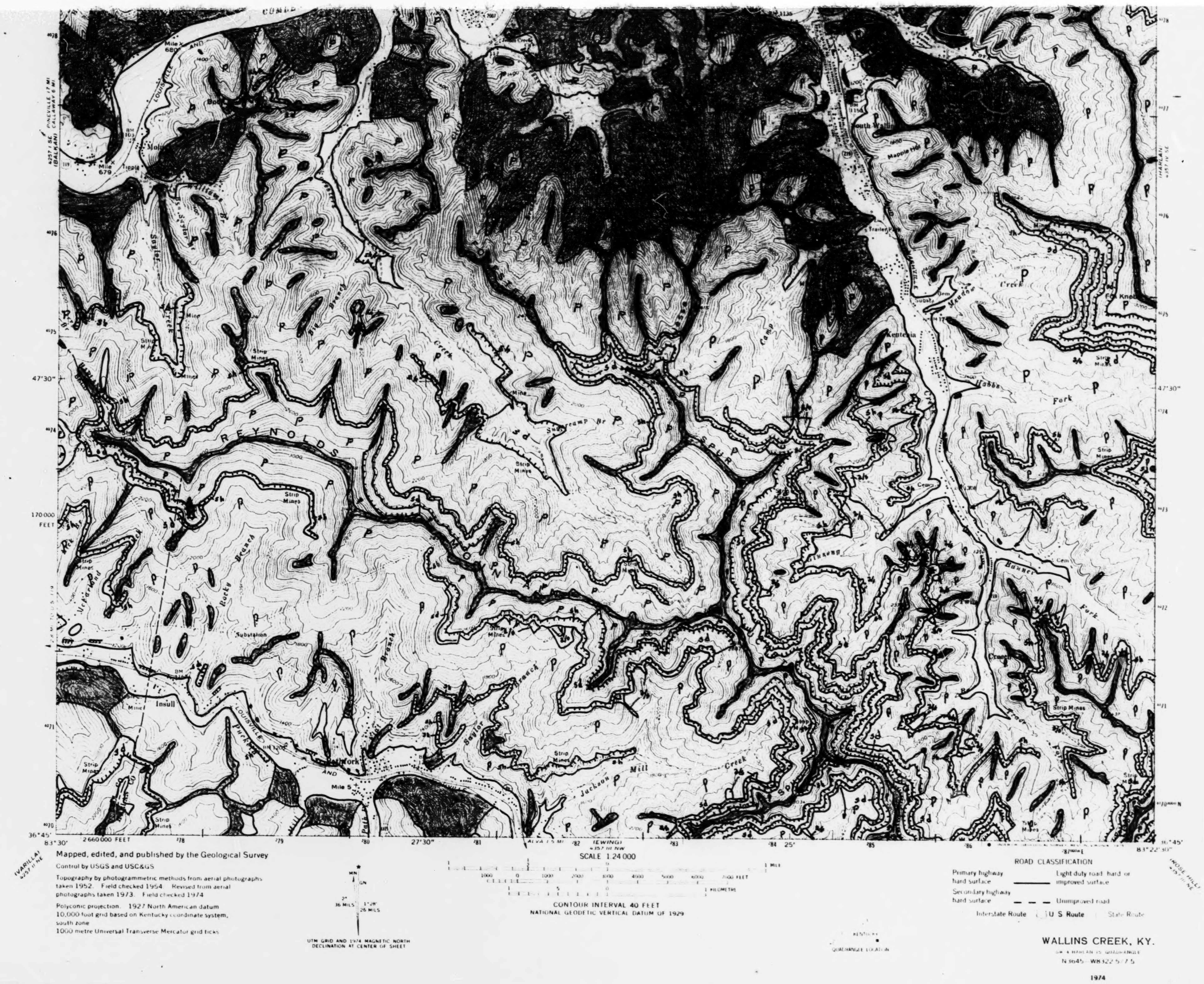
MAN-MADE FEATURES



Landslides and related features interpreted from aerial photographs:
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Photointerpretation and field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE WALLINS CREEK, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(G-5)

ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

P OLD LANDSLIDE
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Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

Coal refuse banks

- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries

- q — quarry site
- qub — spoil bank, quarry waste

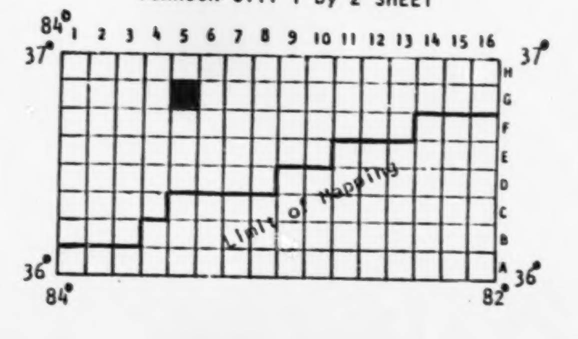
Gravel pits

- g — site of gravel pit

Slides in man-made features

- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
AGRICULTURAL AND INDUSTRIAL DEVELOPMENT BOARD

HARLAN QUADRANGLE
KENTUCKY—HARLAN CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography from aerial photographs by multiplex methods
Aerial photographs taken 1952–1953. Field check 1954

Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system, south zone

Contours in strip mine areas from 1952 and 1953 photographs

1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

KENTUCKY
QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy duty — Light duty
Medium duty — Unimproved dirt
U. S. Route — State Route

HARLAN, KY.
N3645—W8315/7.5
1954
PHOTOREVISED 1978

Field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Data on landslides and strip mines in part from Froelich, A.J. and McKay, E.J., 1972, Geologic map of the Harlan quadrangle, Harlan County, Kentucky: U.S. Geological Survey Geologic Quadrangle map GQ-1015, scale 1:24000.

LANDSLIDES AND RELATED FEATURES

OF THE HARLAN, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (6-6)

NOTE

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MAN-MADE FEATURES

(EWING) 4357 III NW

Mapped, edited, and published by the Geological Survey

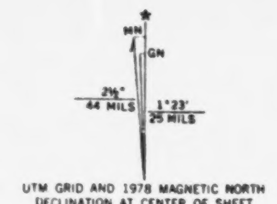
Control by USGS and USC&GS

Topography from aerial photographs by multiplex methods
Aerial photographs taken 1952-1953. Field check 1954

Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system
south zone

Contours in strip mine areas from 1952 and 1953 photographs

1000-meter Universal Transverse Mercator grid ticks
zone 17, shown in blue



UTM GRID AND 1978 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
U. S. Route — State Route

(HUBBARD SPRINGS) 4357 II NW

HARLAN, KY.

N3645—W8315/7.5

1954
PHOTOREVISED 1978

LANDSLIDES AND RELATED FEATURES

OF THE HARLAN, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(G-6)

field check 1980-1981

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Data on landslides and strip mines in part from Froelich, A.J. and McKay, E.J., 1972, Geologic map of the Harlan quadrangle, Harlan County, Kentucky: U.S. Geological Survey Geologic Quadrangle map GQ-1015, scale 1:24000.

ACTIVE OR RECENTLY ACTIVE LANDSLIDE
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P — OLD LANDSLIDE
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Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

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Gravel pits

- g — site of gravel pit

Slides in man-made features

- af — earth flow in fill
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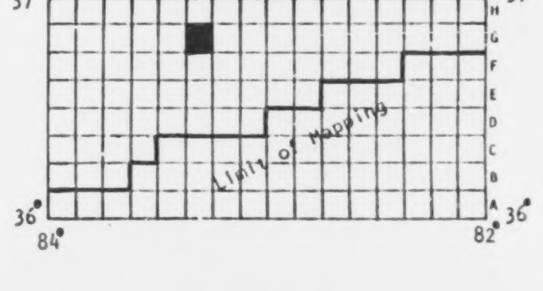
- a/r — earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



LANDSLIDES AND RELATED FEATURES

OF THE EVARTS, KY.-VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(G-7)

field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Data on landslides and strip mines in part from Tazelaar, F. and Newell, W.L., 1974, Geologic map of the Evarts quadrangle and part of the Hubbard Springs quadrangle, Southeastern Kentucky and Virginia: U.S. Geological Survey Geologic

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Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, and TVA

Topography from aerial photographs by multiplex methods
Aerial photographs taken 1952 and 1953. Field check 1954

Polyconic projection. 1927 North American datum
10,000 foot grids based on Kentucky coordinate system, south zone, and Virginia coordinate system, south zone

Contours in strip mine areas compiled from 1952 and 1954 photography

1000 meter Universal Transverse Mercator grid ticks

SCALE 1:24000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1954 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION

Heavy duty — Light duty
Medium duty - - Unimproved dirt
U.S. Route State Route

KENTUCKY
QUADRANGLE LOCATION

EVARTS, KY.-VA.
SW/4 NORTHEAST 15' QUADRANGLE
N 36°45'—W 83°15'/7.5

1954

LANDSLIDES AND RELATED FEATURES

OF THE EVARTS, KY.-VA. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(G-7)

field check 1980-1981

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Data on landslides and strip mines in part from Tazelaar, F. and Newell, W.L., 1974, Geologic map of the Evarts quadrangle and part of the Hubbard Springs quadrangle, Southeastern Kentucky and Virginia: U.S. Geological Survey Geologic Quadrangle Map GQ-914, scale 1:24000.

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P

OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

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Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol ▲ designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

The first six digits of the open file number designate the specific 1:250,000 scale map sheet of which this quadrangle is a part. The last two digits designate the position of the quadrangle in a subdivision of the 1:250,000 scale map based on rows and tiers shown in the diagram to the right. The location of this quadrangle is shown by the black square.

NOTE
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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)
- sh bench with high wall
- sf furrowed with high wall
- sd multiple furrows and multiple benches
- ss hilltop removed
- srg reclaimed by grading
- sru reclaimed by secondary use
- sh/r regraded in part, high wall remains

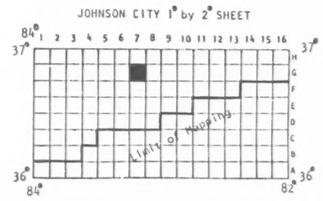
Coal refuse banks
- r identified on aerial photographs; not classified in field check
- rb not burnt nor on fire
- rbb burnt
- rbd burning
- rbs sludge

Quarries
- q quarry site
- qub spoil bank, quarry waste

Gravel pits
- g site of gravel pit

Slides in man-made features
- af earth flow in fill
- a/s earth flow in strip castings
- a/r earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

PENNINGTON GAP QUADRANGLE
VIRGINIA-KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC) 169-SE

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS-NOAA, USGS, CE, and TVA

Topography by photogrammetric methods from aerial photographs taken 1953. Mapped in the field by TVA, 1955

Projection (projection, 1927 North American datum)
10,000-foot grid based on Virginia coordinate system, south zone
Kentucky coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 17

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy duty — Light duty — Unimproved dirt — Fair or warm weather — Trail
U.S. Route — State Route

PENNINGTON GAP, VA.-KY.
N3845-W8307.5
1955

LANDSLIDES AND RELATED FEATURES

OF THE PENNINGTON GAP, VA.-KY. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(G-8)

Field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Data on landslides and strip mines in part from Miller, R.L. and Roen, J.B., 1973, Geologic map of the Pennington Gap quadrangle, Lee County, Virginia and Harlan County, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1098, scale 1:24000.

NOTE

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MAN-MADE FEATURES

LANDSLIDES AND RELATED FEATURES

OF THE PENNINGTON GAP, VA.-KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(G-8)

field check 1980-1981

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Data on landslides and strip mines in part from Miller, R.L. and Roen, J.B., 1973, Geologic map of the Pennington Gap quadrangle, Lee County, Virginia and Harlan County, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1098, scale 1:24000.

ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

P

OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V

COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol ↓ designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

The first six digits of the open file number designate the specific 1:250,000 scale map sheet of which this quadrangle is a part. The last two digits designate the position of the quadrangle in a subdivision of the 1:250,000 scale map based on rows and tiers shown in the diagram to the right. The location of this quadrangle is shown by the black square.

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

- sh — bench with high wall
- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

Coal refuse banks

- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries

- q — quarry site
- qub — spoil bank, quarry waste

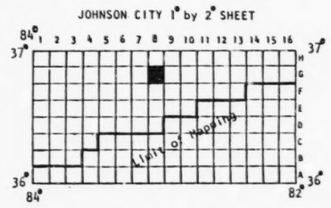
Gravel pits

- g — site of gravel pit

Slides in man-made features

- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

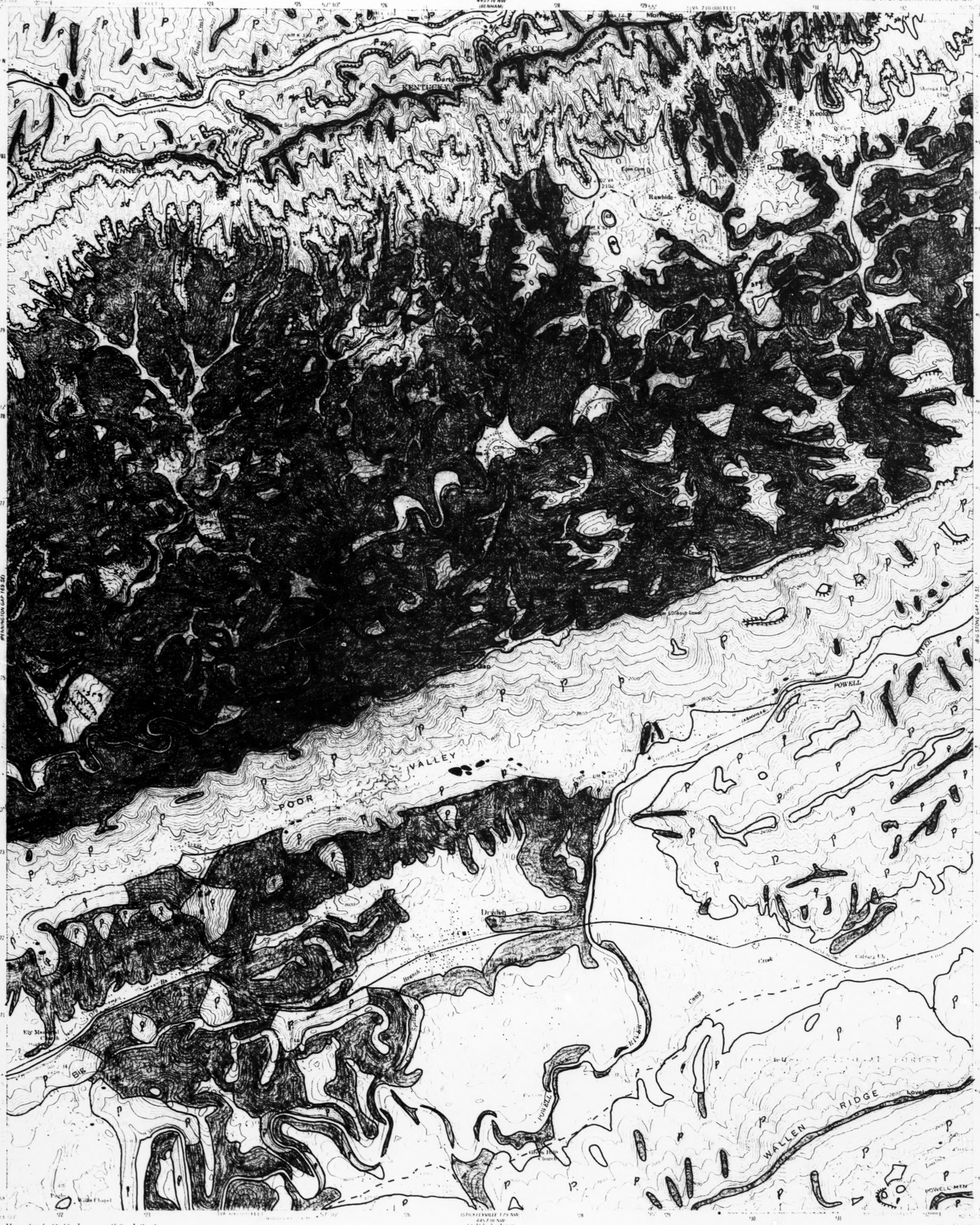
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

KEOKEE QUADRANGLE
VIRGINIA-KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC) 17H-SW



Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS, NOAA, USGS, and TVA

Topography by photogrammetric methods from aerial photographs taken 1955. Map field checked by TVA 1955

Polyconic projection. 1927 North American datum
10,000-foot grid based on Virginia coordinate system
Red tint overlay shows Virginia-Kentucky State boundary
Dashed land lines indicate approximate boundaries

Unchecked elevations are shown in feet thus: 1000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Heavy duty	Hard surface road
Medium duty	Loose surface road
Light duty	Trail
U.S. Route	State Route

In developed areas, only through routes are classified.

KEOKEE, VA.-KY.
1955

Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981
This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE KEOKEE, VA.-KY. QUADRANGLE

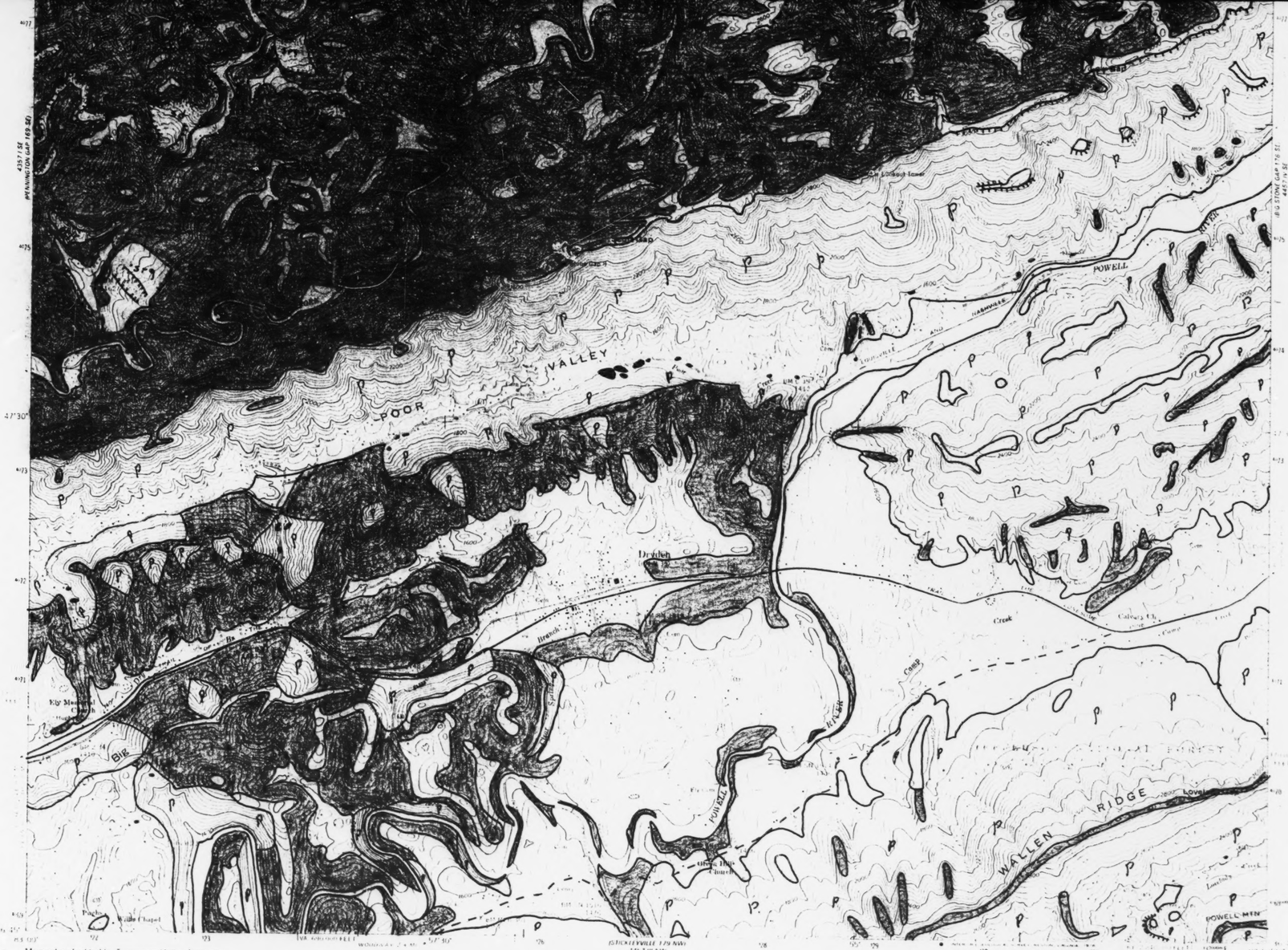
by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (G-9)

NOTE
Information shown is intended as a general guide to ground conditions as of the date of field check. Additional landslides and rockfalls should be anticipated in all map units. The map unit depicts the dominant condition in the area delineated and variations in slope stability may occur at any point in the unit. This map is suitable for general planning purposes and as a supplement to more detailed studies for site selection. The map cannot be used as a substitute for detailed geologic and engineering investigations to establish design and construction criteria of specific sites. Some symbols may not appear on this map because the description is applicable to a series of maps.



Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS/NOAA, USGS, and TVA

Topography by photogrammetric methods from aerial photographs taken 1963. Map field checked by TVA 1965

Polyconic projection 1927 North American datum
10,000-foot grid based on Virginia coordinate system
Kentucky coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks

SCALE 1:24000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1975 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION

Heavy duty — Four wheel road
Medium duty — Wagon and jeep trail
Light duty — Foot trail
U.S. Route — State Route

In developed areas, only through roads are classified

KEOKEE, VA.-KY.

NW4 Wallen 7.5
1955

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE KEOKEE, VA.-KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (G-9)

ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

P — OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V — COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol ▲ designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

sh	bench with high wall
sf	furrowed with high wall
sd	multiple furrows and multiple benches
ss	hilltop removed
srg	reclaimed by grading
sru	reclaimed by secondary use
sh/r	regraded in part, high wall remains

Coal refuse banks

r	identified on aerial photographs; not classified in field check
rb	not burnt nor on fire
rbb	burnt
rbd	burning
rbs	sludge

Quarries

q	quarry site
qub	spoil bank, quarry waste

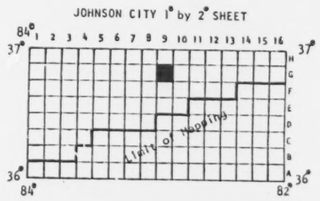
Gravel pits

g	site of gravel pit

Slides in man-made features

af	earth flow in fill
a/s	earth flow in strip castings
a/r	earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

BIG STONE GAP QUADRANGLE
VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC) 178-SE

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS/NOAA, USGS, and TVA

Topography by photogrammetric methods using aerial photographs taken 1952. Map field checked by TVA, 1957

Polyconic projection. 1927 North American datum
10,000-foot grid based on Virginia (South) rectangular coordinate system
1000-meter Universal Transverse Mercator grid ticks

UTM grid and 1977 magnetic north declination at center of sheet

LANDSLIDES AND RELATED FEATURES

OF THE BIG STONE GAP, VA. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(G-10)

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Data on landslides in part from Miller, R.L. 1965, Geologic map of the Big Stone Gap Quadrangle, Virginia: U.S. Geological Survey Geologic Quadrangle Map GQ-424, Scale 1:24000.

NOTE

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MAN-MADE FEATURES

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS/NOAA, USGS, and TVA

Topography by photogrammetric methods using aerial photographs taken 1953. Map field checked by TVA, 1957

Polyconic projection. 1927 North American datum
10,000-foot grid based on Virginia (South) rectangular coordinate system
1000 meter Universal Transverse Mercator grid ticks.

UTM GRID AND 1977 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy-duty — Poor motor road
Medium-duty — Wagon and jeep track
Light-duty — Foot trail
U. S. Route
State Route
In developed areas, only through roads are classified

BIG STONE GAP, VA.
N3645-W8245/7.5
1957

LANDSLIDES AND RELATED FEATURES

OF THE BIG STONE GAP, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(G-10)

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Data on landslides in part from Miller, R.L. 1965, Geologic map of the Big Stone Gap Quadrangle, Virginia: U.S. Geological Survey Geologic Quadrangle Map GQ-424, Scale 1:24000.

ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

P
OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V
COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol ▽ designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

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- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

Coal refuse banks

- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries

- q — quarry site
- qub — spoil bank, quarry waste

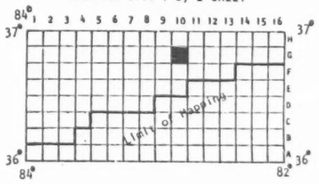
Gravel pits

- g — site of gravel pit

Slides in man-made features

- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

EAST STONE GAP QUADRANGLE
VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC) 187-SW

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by USC&GS, USGS, and TVA

Topography by multiplex methods from aerial photographs taken 1953. Field examination by TVA, 1957

Polyconic projection. 1927 North American datum
10,000 foot grid based on Virginia (South) rectangular coordinate system

1000 meter Universal Transverse Mercator Grid ticks

UTM GRID AND 1964 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy duty — Light duty
Medium duty — Poor motor road
U. S. Route — State Route

In developed areas, only through roads are classified.

EAST STONE GAP, VA.

N3645—W8737.5/7.5

1957

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE EAST STONE GAP, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

NOTE

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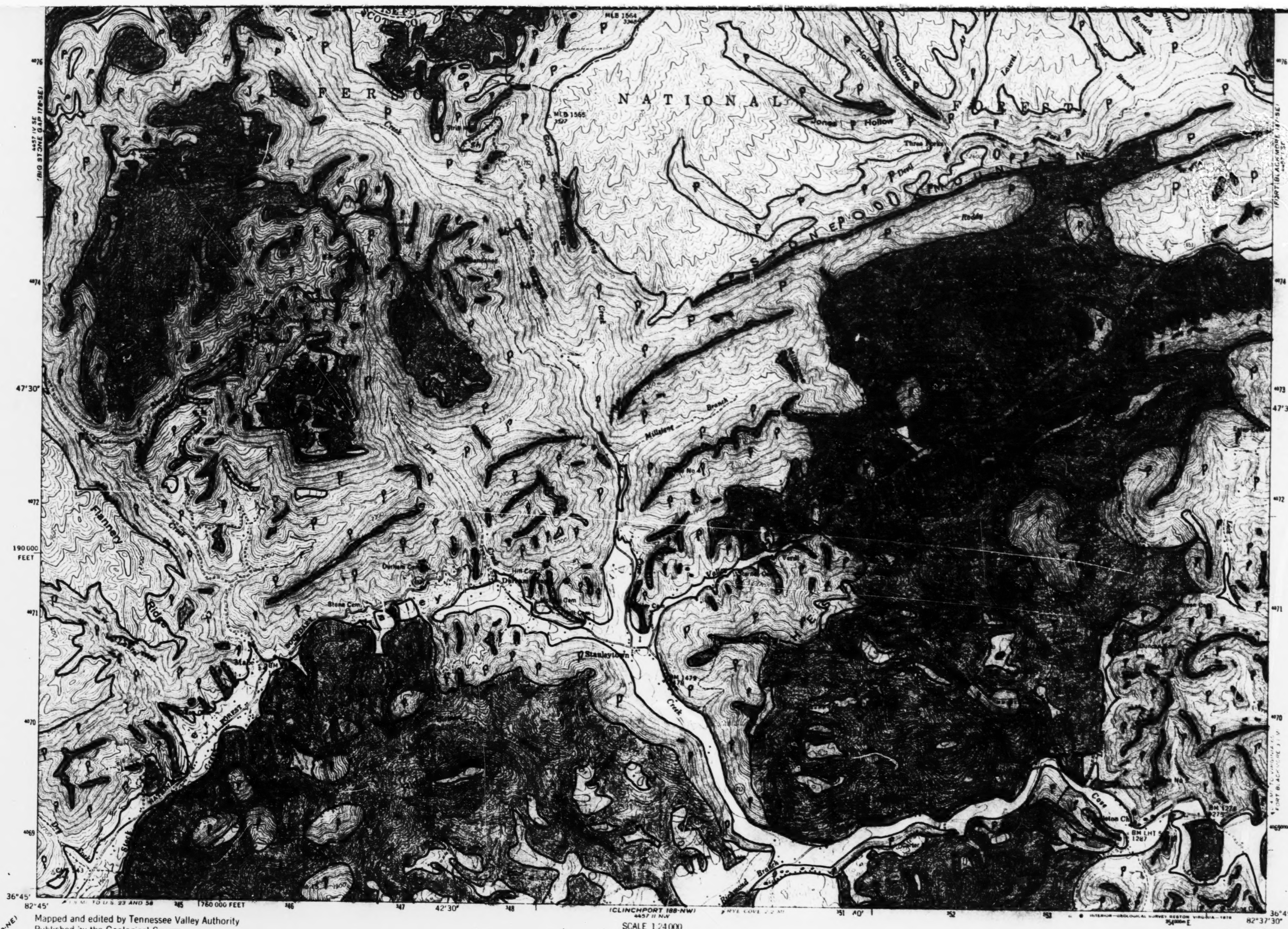


Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by USC&GS, USGS, and TVA

Topography by multiplex methods from aerial photographs taken 1953. Field examination by TVA, 1957

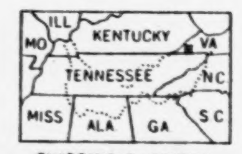
Polyconic projection. 1927 North American datum
10,000 foot grid based on Virginia (South) rectangular coordinate system

1000 meter Universal Transverse Mercator Grid ticks

UTM GRID AND 1969 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy-duty — Light duty
Medium-duty — Poor motor road
U. S. Route — State Route

In developed areas, only through roads are classified

EAST STONE GAP, VA.

N3645—W8237.5/7.5

1957

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

PhotoInterpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE EAST STONE GAP, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(G-11)

NOTE

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ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

P — OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V — COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

sh	bench with high wall
sf	furrowed with high wall
sd	multiple furrows and multiple benches
ss	hilltop removed
srg	reclaimed by grading
sru	reclaimed by secondary use
sh/r	regraded in part, high wall remains

Coal refuse banks

r	identified on aerial photographs; not classified in field check
rb	not burnt nor on fire
rbb	burnt
rbd	burning
rbs	sludge

Quarries

q	quarry site
qub	spoil bank, quarry waste

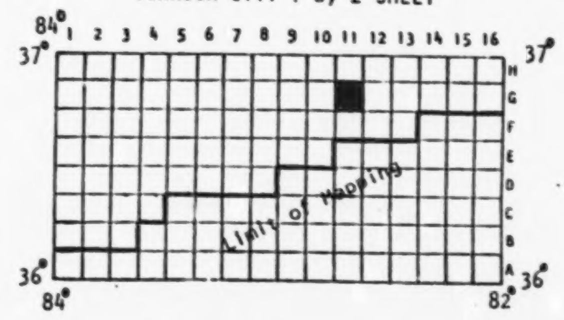
Gravel pits

g	site of gravel pit

Slides in man-made features

af	earth flow in fill
a/s	earth flow in strip castings
a/r	earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



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1000 meter Universal Transverse Mercator Grid ticks.

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE FORT BLACKMORE, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

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10,000 foot grid based on Virginia (South) rectangular coordinate system

1000 meter Universal Transverse Mercator Grid ticks,

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
DASHED LINES REPRESENT HALF INTERVAL CONTOURS
DATUM IS MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION 1957

QUADRANGLE LOCATION
(ILL. KENTUCKY VA. MO. TENNESSEE NC. MISS. ALA. GA. S.C.)

ROAD CLASSIFICATION
Heavy duty — Light duty
Medium duty = Poor motor road
U.S. Route (State Route)

INTERIOR-GEOLOGICAL SURVEY, WASHINGTON, D.C.-1976-W6 4351
(TVA-147-SE)

FORT BLACKMORE, VA.

N3645—W8230/7.5

1957

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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U.S. Geological Survey

OPEN FILE MAP 82-0422 (G-12)

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- sf furrowed with high wall
- sd multiple furrows and multiple benches
- ss hilltop removed
- srg reclaimed by grading
- sru reclaimed by secondary use
- sh/r regraded in part, high wall remains

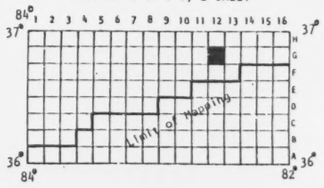
Coal refuse banks
- r identified on aerial photographs; not classified in field check
- rb not burnt nor on fire
- rbb burnt
- rbd burning
- rbs sludge

Quarries
- q quarry site
- qub spoil bank, quarry waste

Gravel pits
- g site of gravel pit

Slides in man-made features
- af earth flow in fill
- a/s earth flow in strip castings
- a/r earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

DUNGANNON QUADRANGLE
VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC) 196-SW

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by USC&GS, USGS, and TVA

Topography by multiplex methods from aerial photographs taken 1946. Field examination by TVA 1957

Polyconic projection. 1927 North American datum
10,000-foot grid based on Virginia (South) rectangular coordinate system

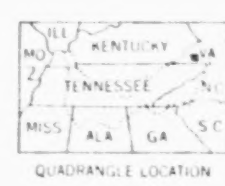
1000-meter Universal Transverse Mercator Grid ticks.

APPROXIMATE MEAN DECLINATION 1957

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION



QUADRANGLE LOCATION

DUNGANNON, VA.
N3645—W8222.5/7.5
1957

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE DUNGANNON, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (G-13)

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Topography by multiplex methods from aerial photographs taken 1948. Field examination by TVA, 1957

Polyconic projection, 1927 North American datum
10,000-foot grid based on Virginia coordinate system
1000-meter Universal Transverse Mercator Grid ticks

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DASHED LINES REPRESENT HALF INTERVAL CONTOURS
DATUM IS MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION 1957

QUADRANGLE LOCATION

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N3645-W8222.5/7.5
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Coal refuse banks
- r identified on aerial photographs; not classified in field check
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- rbb burnt
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- rbs sludge

Quarries
- q quarry site
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Gravel pits
- g site of gravel pit

Slides in man-made features
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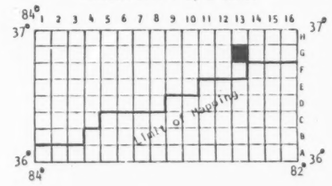
JOHNSON CITY 1° by 2° SHEET



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1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE MOLL CREEK, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

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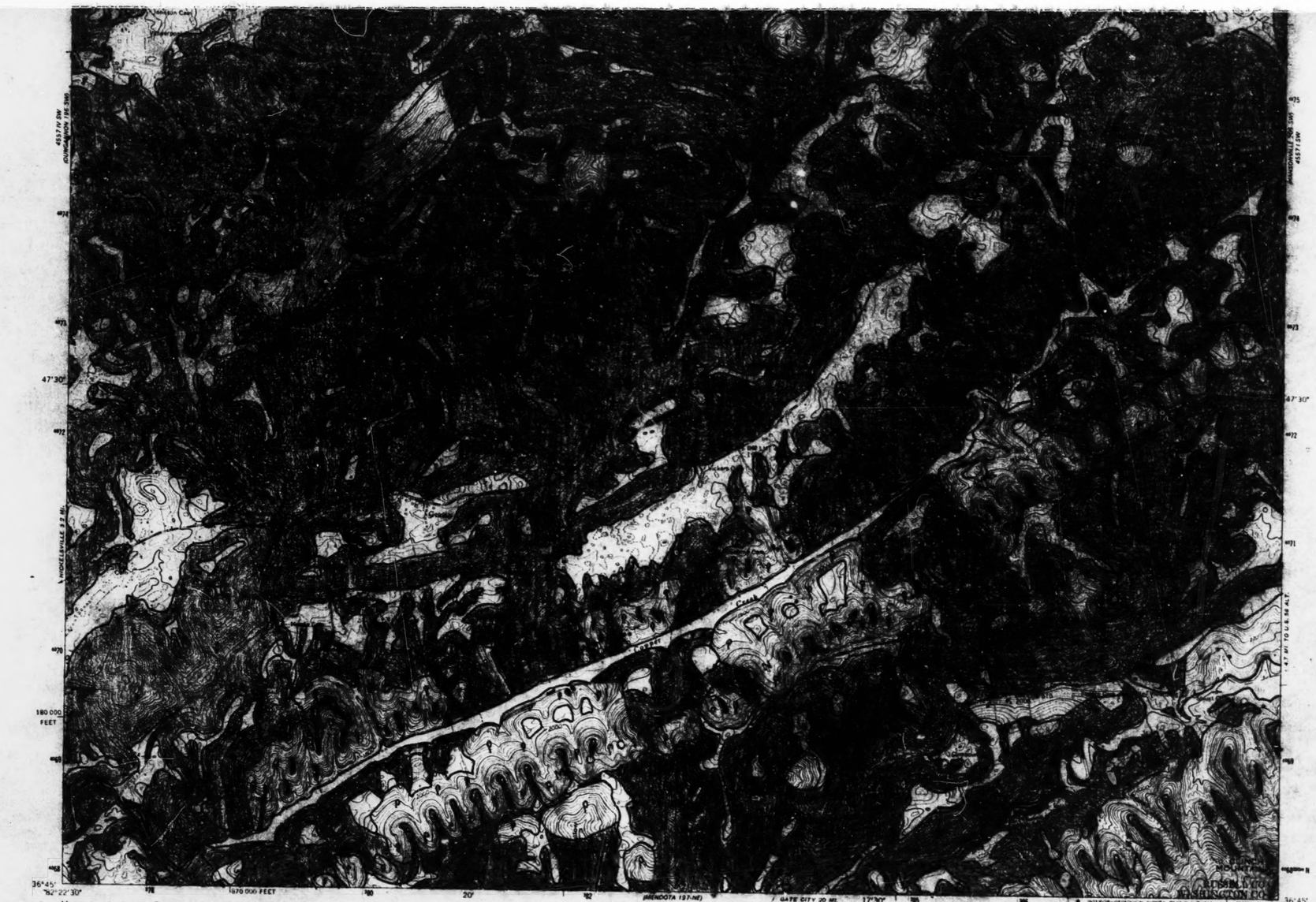

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS/NOAA, USGS, and TVA

Topography by photogrammetric methods using aerial photographs taken 1946. Map field checked by TVA, 1958

Polyconic projection. 1927 North American datum
10,000-foot grid based on Virginia (South) rectangular coordinate system

1000 meter Universal Transverse Mercator grid (zone 17)

SCALE 1:24000

1 MILE
1 KILOMETER

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy duty — Poor motor road
Medium duty — Wagon and jeep track
Light duty — Foot trail
U. S. Route — State Route

MOLL CREEK, VA.

N3645—W8215/7.5

1958

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1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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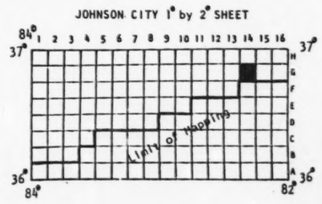

UNITED STATES
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GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

HANSONVILLE QUADRANGLE
VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC) 205-SW

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
DASHED LINE REPRESENTS SUPPLEMENTARY CONTOUR
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Heavy duty	Poor motor road
Medium duty	Wagon and jeep track
Light duty	Foot trail
U.S. Route	State Route

HANSONVILLE, VA.
N3645—W8207.5/7.5
1938

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by TENNESSEE VALLEY AUTHORITY and TVA

Topography by photogrammetric methods from aerial photographs. Map field checked by TVA 1938

Polyconic projection. 1927 North American datum
10 000-foot grid based on Virginia coordinate system, zone 1
1000-meter Universal Transverse Mercator grid ticks, zone 17

LANDSLIDES AND RELATED FEATURES

OF THE HANSONVILLE, VA. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0423(c-15)

field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

NOTE

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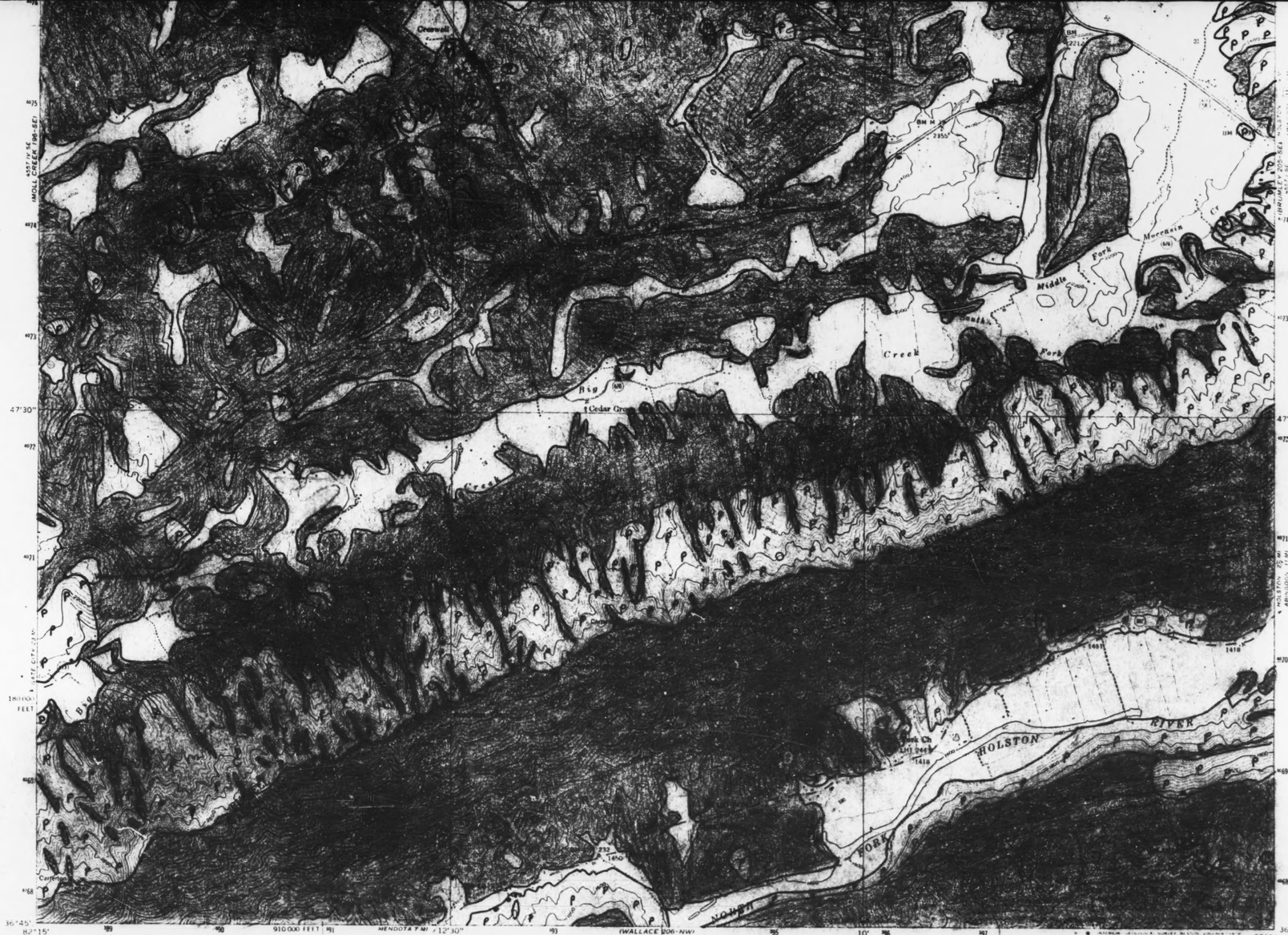

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by TVA/NOAA, USGS, and TVA

Topography by photogrammetric methods from aerial photographs. Map field checked by TVA, 1938

Polyconic projection. 1927 North American datum
10,000 foot grid based on Virginia Coordinate zone, lambert conformal coordinate system

ROAD CLASSIFICATION

Heavy duty	Four motor road
Medium duty	Wagon and jeep track
Light duty	Foot trail
U.S. Route	State Route

HANSONVILLE, VA.

N3645—W8207/5/7.5

1938

field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE HANSONVILLE, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(G-15)

ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

The first six digits of the open file number designate the specific 1:250,000 scale map sheet of which this quadrangle is a part. The last two digits designate the position of the quadrangle in a subdivision of the 1:250,000 scale map based on rows and tiers shown in the diagram to the right. The location of this quadrangle is shown by the black square.

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MAN-MADE FEATURES
Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

sh	bench with high wall
sf	furrowed with high wall
sd	multiple furrows and multiple benches
ss	hilltop removed
srg	reclaimed by grading
sru	reclaimed by secondary use
sh/r	regraded in part, high wall remains

Coal refuse banks

r	identified on aerial photographs; not classified in field check
rb	not burnt nor on fire
rbb	burnt
rbd	burning
rbs	sludge

Quarries

q	quarry site
qub	spoil bank, quarry waste

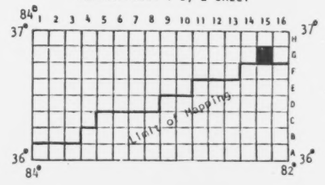
Gravel pits

g	site of gravel pit

Slides in man-made features

af	earth flow in fill
a/s	earth flow in strip castings
a/r	earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

BRUMLEY QUADRANGLE
VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC) 205 SE

Mapped and edited by Tennessee Valley Authority

BRUMLEY, VA.

1938

LANDSLIDES AND RELATED FEATURES

OF THE BRUMLEY, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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NOTE

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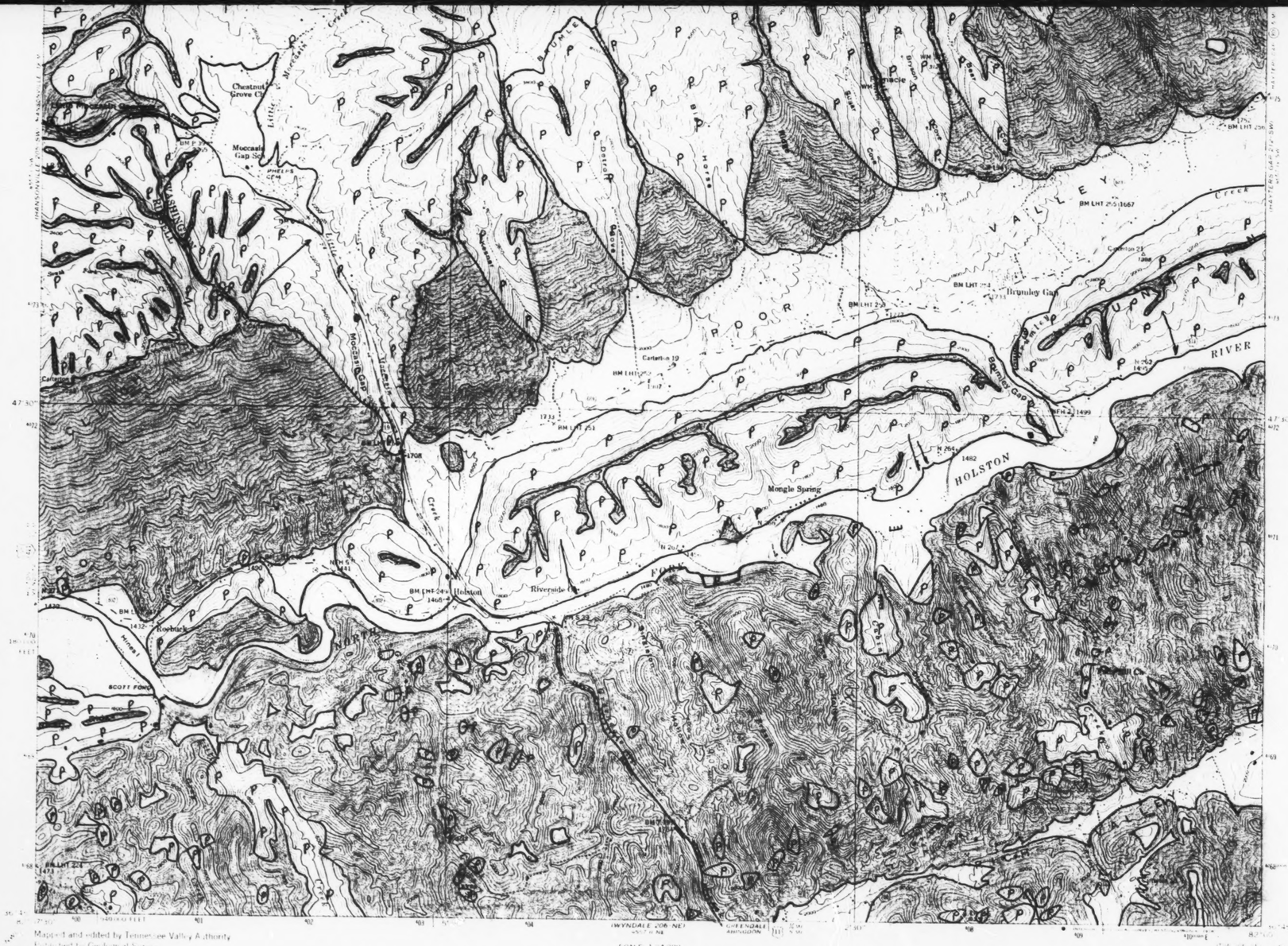

Mapped and edited by Tennessee Valley Authority

Published by Geological Survey

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET

ROAD CLASSIFICATION

Heavy duty — Poor motor road

Medium duty — Wagon and jeep trail

Light duty — Foot trail

U.S. Route — State Route

BRUMLEY, VA.

1938

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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ACTIVE OR RECENTLY ACTIVE LANDSLIDE

Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

P

OLD LANDSLIDE

Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V

COLLUVIAL SLOPE

Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

LANDSLIDES AND RELATED FEATURES

OF THE BRUMLEY, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (G-16)

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES

Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol ▲ designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL

Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING

Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES

Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

- sh — bench with high wall
- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

Coal refuse banks

- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries

- q — quarry site
- qub — spoil bank, quarry waste

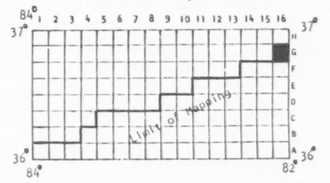
Gravel pits

- g — site of gravel pit

Slides in man-made features

- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

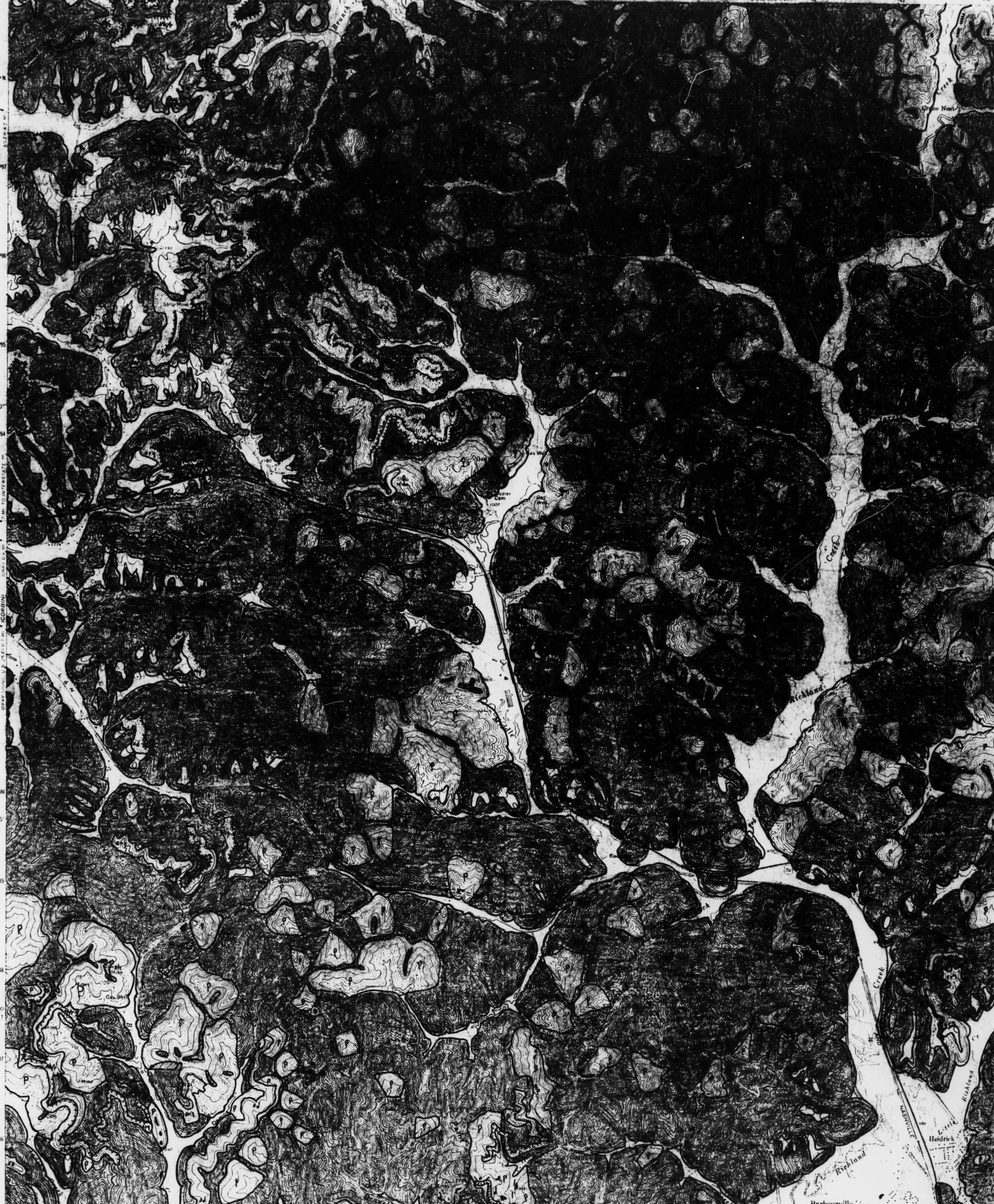
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
KENTUCKY GEOLOGICAL SURVEY
UNIVERSITY OF KENTUCKY

HEIDRICK QUADRANGLE
KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 BARBOURVILLE 15' QUADRANGLE



Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1951. Field checked 1952. Revised from aerial photographs taken 1973. Field checked 1974

Polyconic projection. 1927 North American datum
10,000 foot grid based on Kentucky coordinate system, south zone

1000 metre Universal Transverse Mercator grid ticks

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Primary highway, hard surface — Light duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U.S. Route — State Route

KENTUCKY
QUADRANGLE LOCATION

HEIDRICK, KY.
NW/4 BARBOURVILLE 15' QUADRANGLE
N3652.5—W8352.5/7.5

1974

LANDSLIDES AND RELATED FEATURES

OF THE HEIDRICK, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(H-1)

field check 1980-1981

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Data on strip mines in part from Trimble, D.E. and Smith, J.H., 1978, Geologic map of the Heidrick Quadrangle, Knox and Laurel Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1501, Scale 1:24000.

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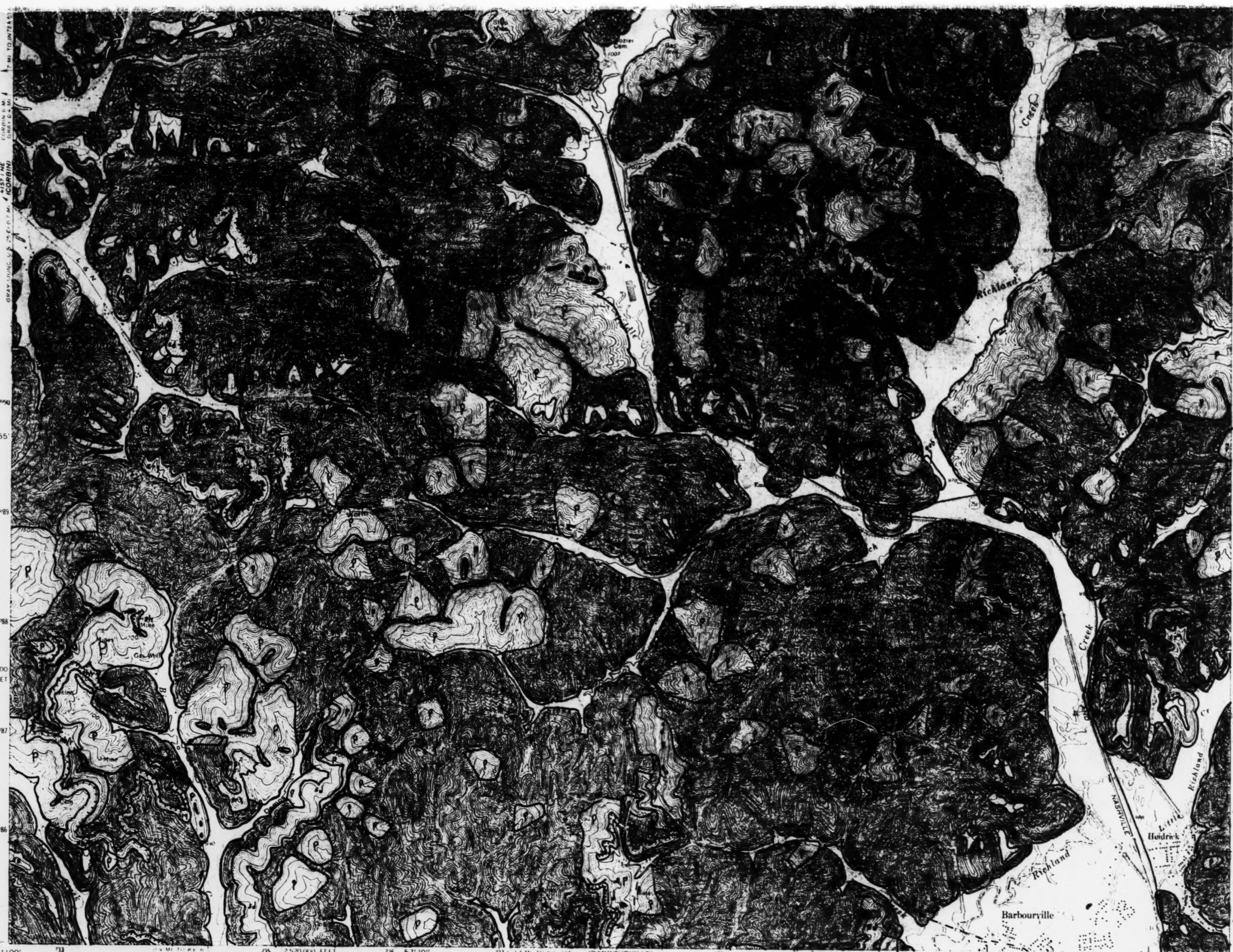

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Topography by photogrammetric methods from aerial photographs taken 1951. Field checked 1952. Revised from aerial photographs taken 1973. Field checked 1974

Polyconic projection. 1927 North American datum
10,000 foot grid based on Kentucky coordinate system, south zone

1000 metre Universal Transverse Mercator grid ticks

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

(BARBOURVILLE)

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

KENTUCKY
QUADRANGLE LOCATION

ROAD CLASSIFICATION

Primary highway, hard surface — Light duty road, hard or improved surface

Secondary highway, hard surface — Unimproved road

Interstate Route — U.S. Route — State Route

HEIDRICK, KY.
NW/4 BARBOURVILLE 15' QUADRANGLE
N3652.5—W8352.5/7.5

1974

LANDSLIDES AND RELATED FEATURES

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William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(H-1)

field check 1980-1981

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P — OLD LANDSLIDE
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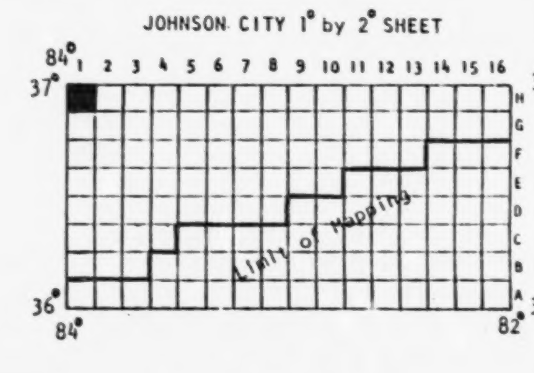
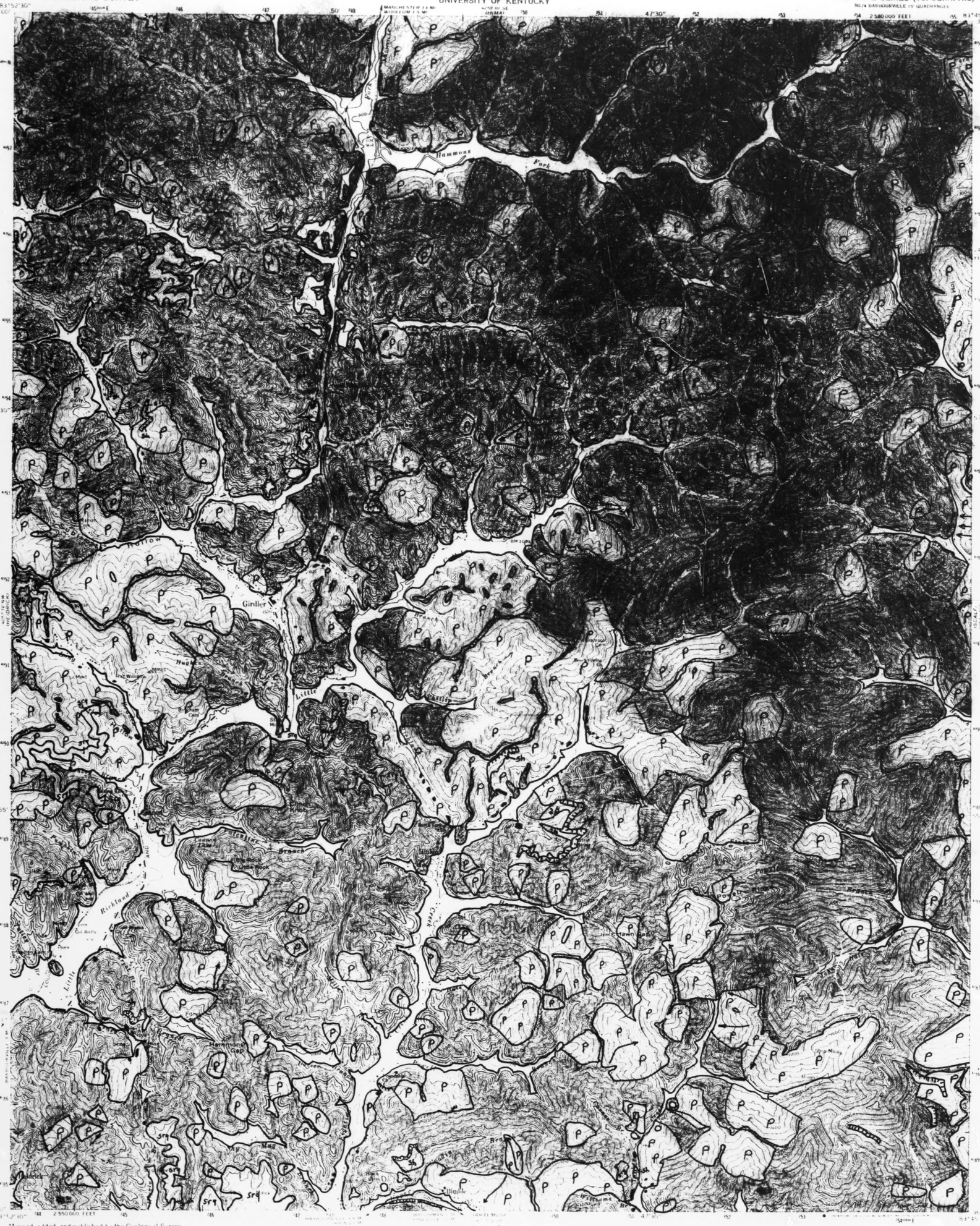
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
KENTUCKY GEOLOGICAL SURVEY
UNIVERSITY OF KENTUCKY

FOUNT QUADRANGLE
KENTUCKY–KNOX CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Control by USGS, NOS/NOAA, and Tennessee Valley Authority

Topography by photogrammetric methods from aerial photographs taken 1961. Field checked 1962. Revised from aerial photographs taken 1973. Field checked 1974

Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system, South Zone
1000-meter Universal Transverse Mercator grid ticks

FOUNT, KY.

1974

field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Data on strip mines in part from Ping, R.G. and Sergeant, R.E., 1978, Geologic Map of the Fount quadrangle, Knox County, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1487, Scale 1:24000.

LANDSLIDES AND RELATED FEATURES

OF THE FOUNT, KY. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(H-2)

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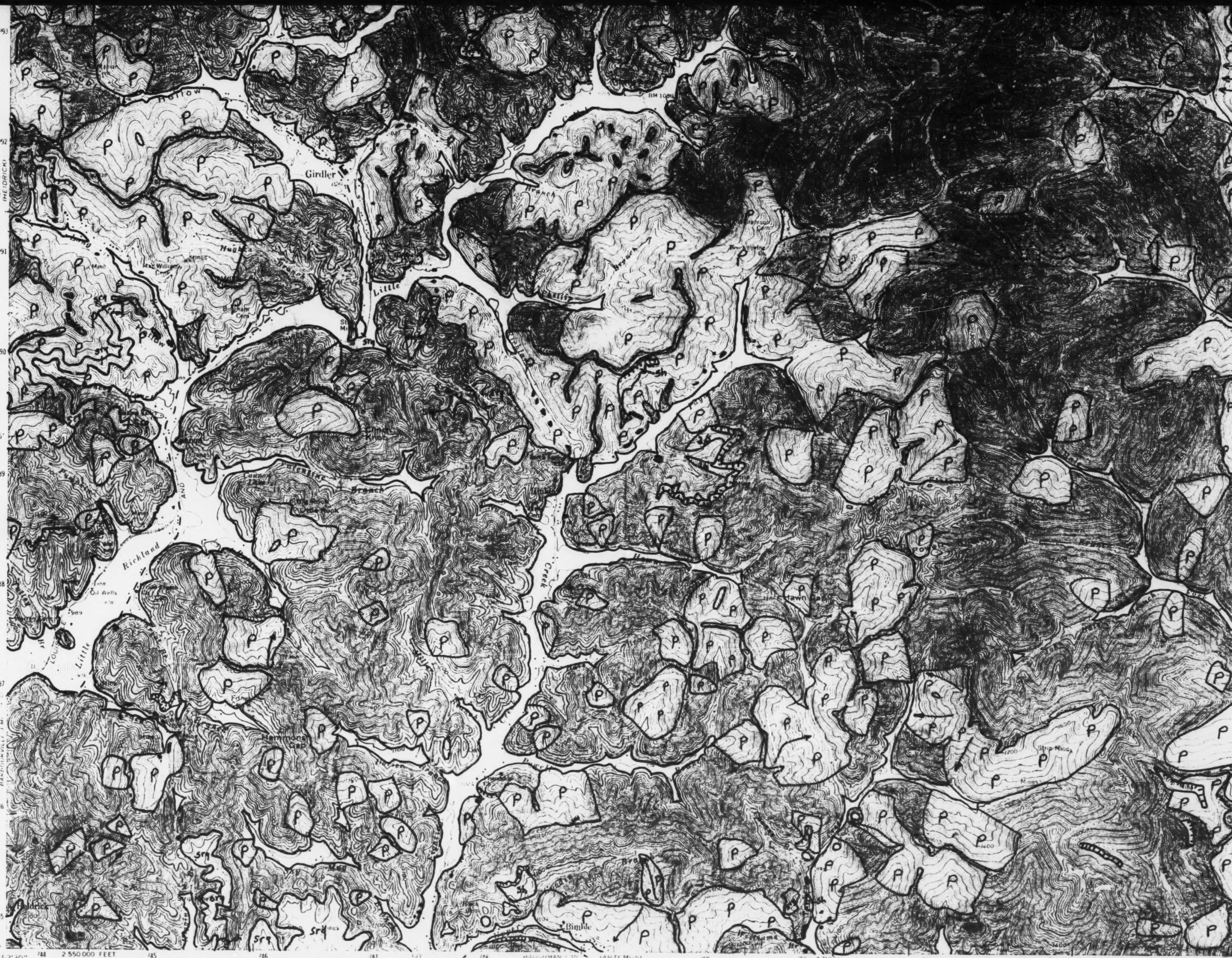

Mapped, edited, and published by the Geological Survey

Control by USGS, NOS/NOAA, and Tennessee Valley Authority

Topography by photogrammetric methods from aerial photographs taken 1951. Field checked 1952. Revised from aerial photographs taken 1973. Field checked 1974

Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system, south zone
1000-metre Universal Transverse Mercator grid ticks

ROAD CLASSIFICATION

FOUNT, KY.

1974

LANDSLIDES AND RELATED FEATURES

OF THE FOUNT, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(H-2)

field check 1980-1981

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Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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MAN-MADE FEATURES
Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

sh	bench with high wall
sf	furrowed with high wall
sd	multiple furrows and multiple benches
ss	hilltop removed
srg	reclaimed by grading
sru	reclaimed by secondary use
sh/r	regraded in part, high wall remains

Coal refuse banks

r	identified on aerial photographs; not classified in field check
rb	not burnt nor on fire
rbb	burnt
rbd	burning
rbs	sludge

Quarries

q	quarry site
qub	spoil bank, quarry waste

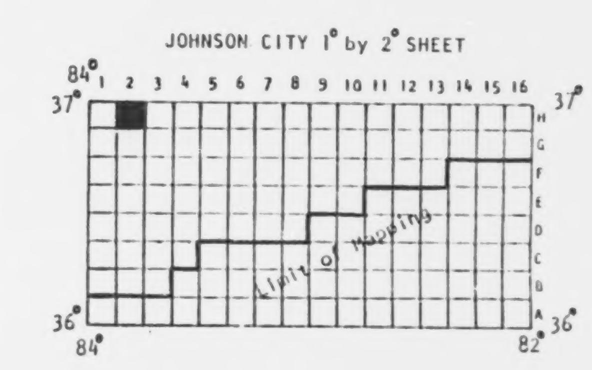
Gravel pits

g	site of gravel pit

Slides in man-made features

af	earth flow in fill
a/s	earth flow in strip castings
a/r	earth flow in coal refuse

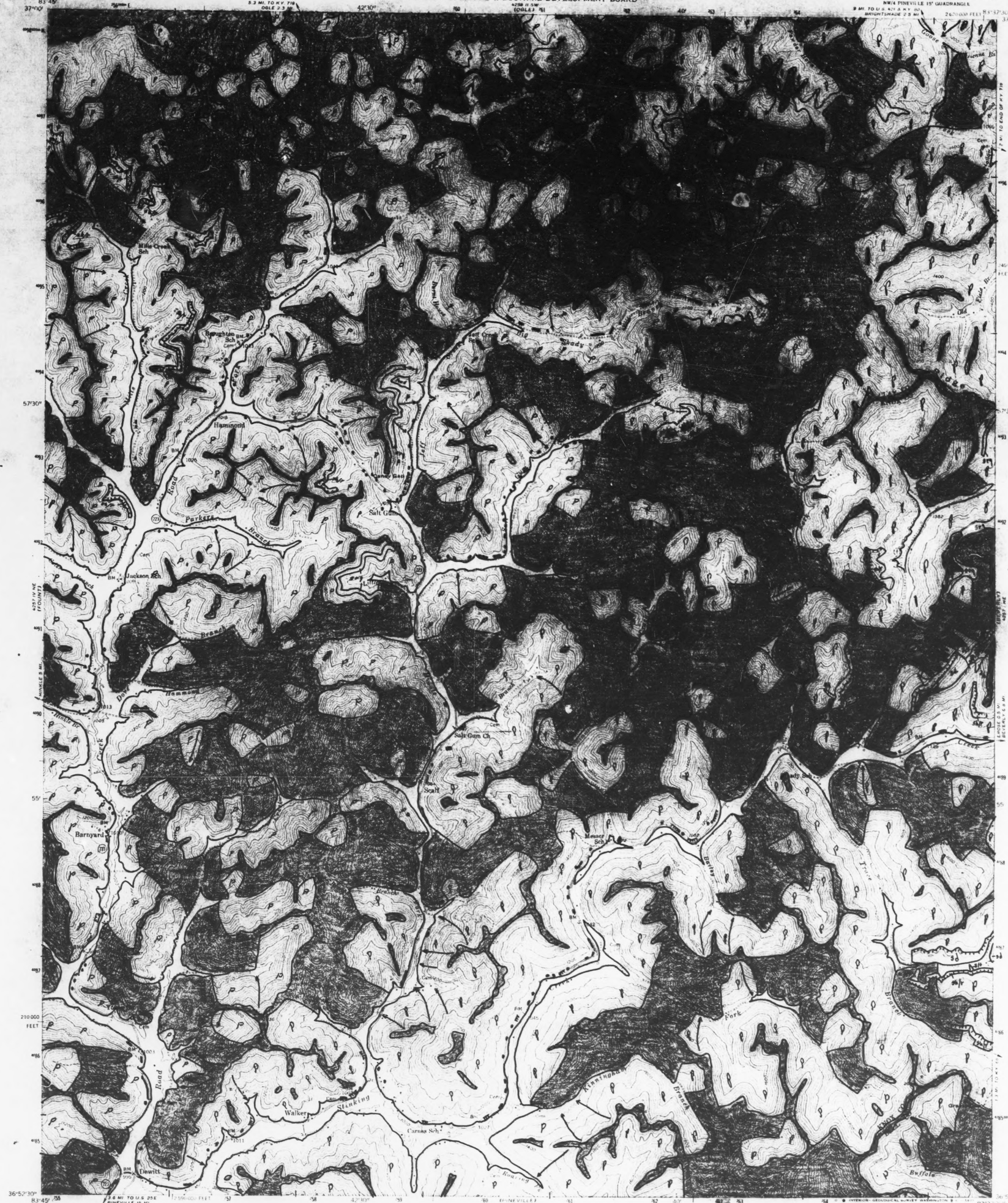
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
AGRICULTURAL AND INDUSTRIAL DEVELOPMENT BOARD

SCALF QUADRANGLE
KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography from aerial photographs by stereoplanigraph
Aerial photographs taken 1952. Field check 1954

Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system, south zone

1000-meter Universal Transverse Mercator grid ticks.

ROAD CLASSIFICATION

Heavy duty — Light duty
Medium duty — Unimproved dirt
U.S. Route (State Route)

SCALF, KY.

1954

field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE SCALF, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (H-3)

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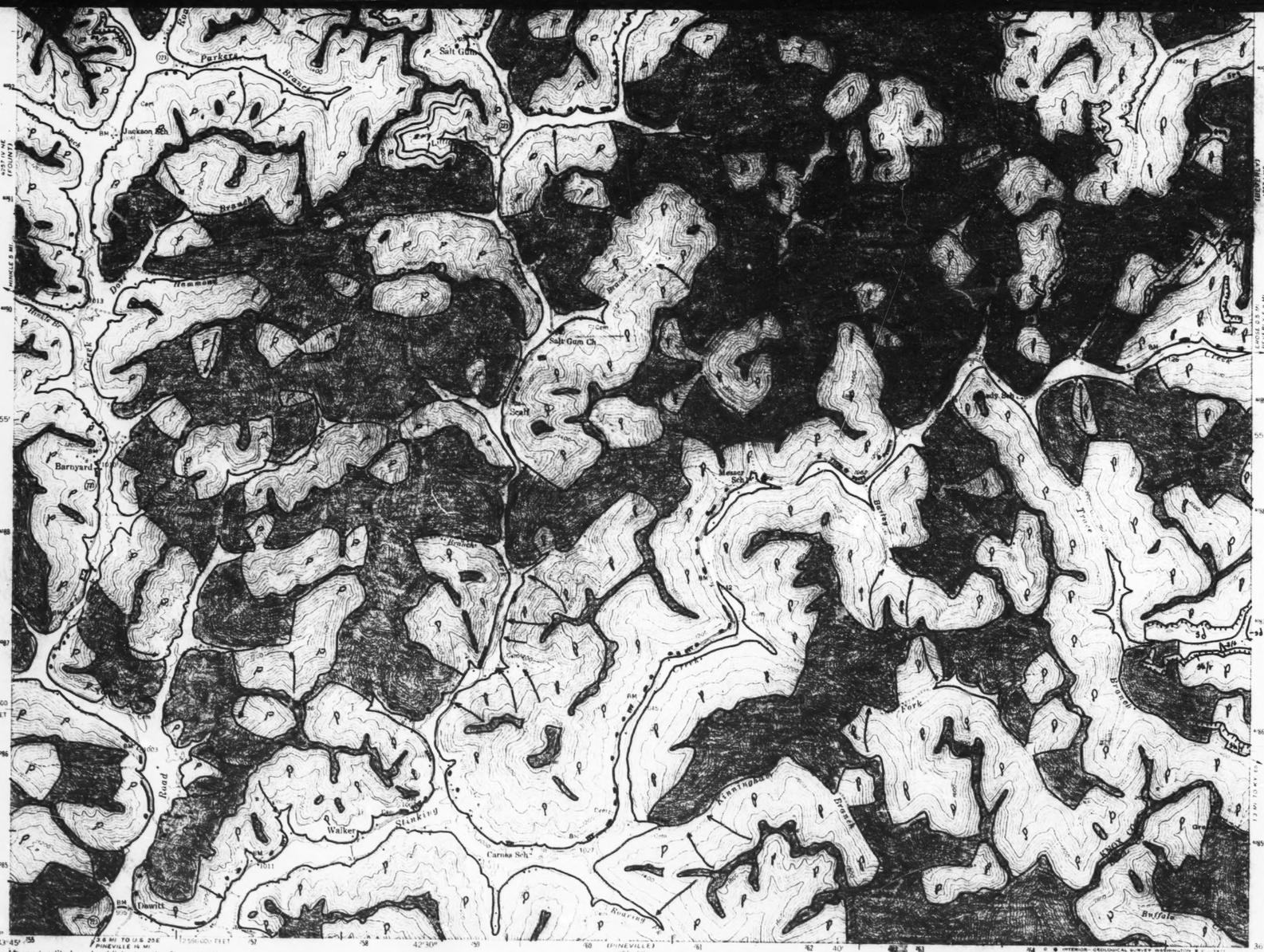

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Control by USGS and USC&GS

Topography from aerial photographs by stereoplanigraph
Aerial photographs taken 1952 Field check 1954

Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system, south zone

1000-meter Universal Transverse Mercator grid ticks.

ROAD CLASSIFICATION

Heavy duty — Light duty
Medium duty — Unimproved dirt
U.S. Route State Route

SCALF, KY.

NW/4 PINEVILLE 15' QUADRANGLE
N 36°52.5' W 83°37.5'/7.5

1954

field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE SCALF, KY. QUADRANGLE

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1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (H-3)

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OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

- sh — bench with high wall
- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

Coal refuse banks

- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries

- q — quarry site
- qub — spoil bank, quarry waste

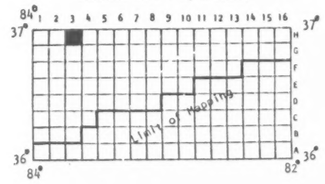
Gravel pits

- g — site of gravel pit

Slides in man-made features

- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

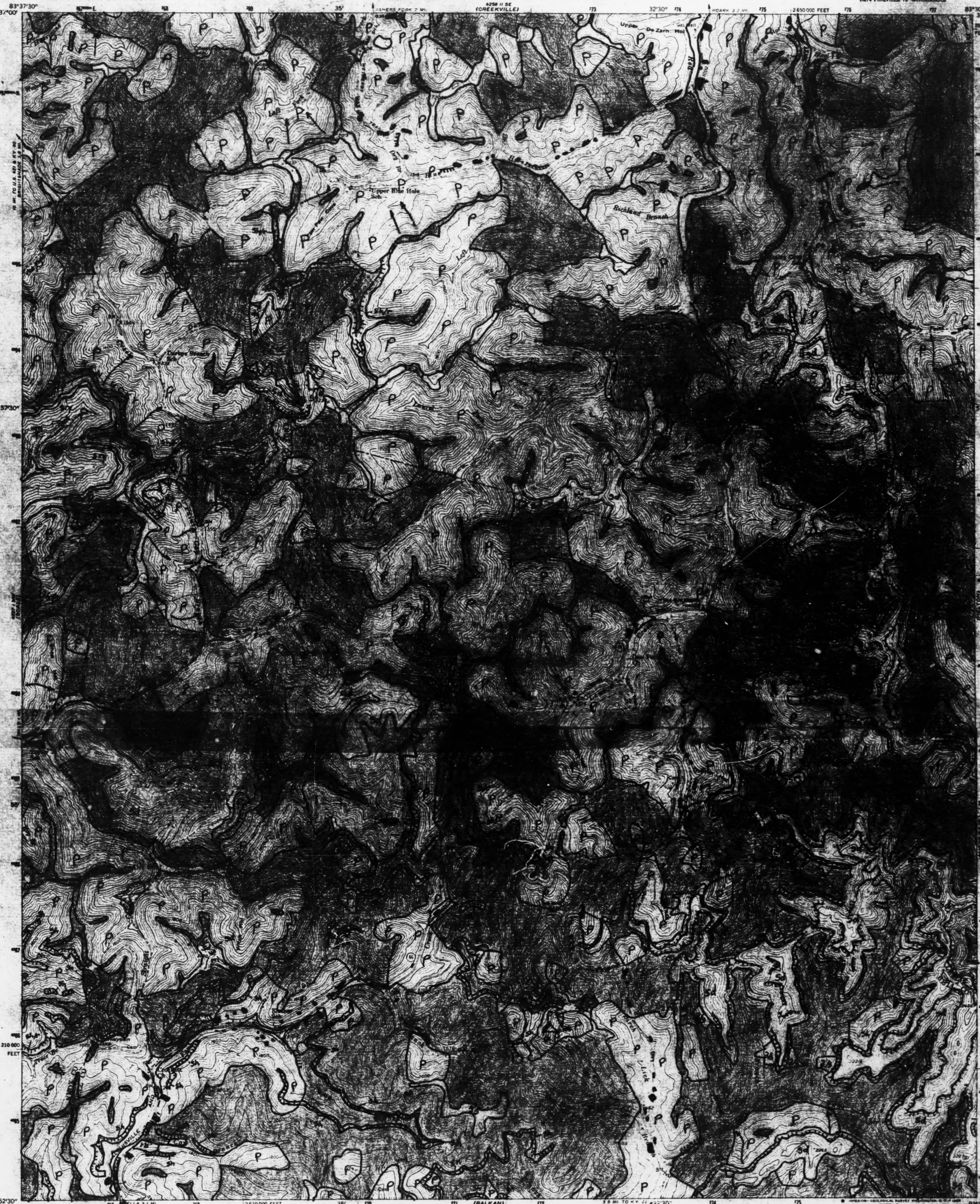
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
AGRICULTURAL AND INDUSTRIAL DEVELOPMENT BOARD

BEVERLY QUADRANGLE
KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC)
NE/4 PINEVILLE 15' QUADRANGLE



Mapped, edited, and published by the Geological Survey

Control by USC&GS

Topography from aerial photographs by stereoplanigraph methods
Aerial photographs taken 1952. Field check 1954

Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system, south zone

1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

UTM GRID AND 1954 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
U.S. Route — State Route

BEVERLY, KY.

LANDSLIDES AND RELATED FEATURES

OF THE BEVERLY, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(H-4)

field check 1980-1981

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Strip mines (combination of letter symbols indicates complex formed of more than one

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Aerial photographs taken 1952 Field check 1954

Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system, south zone

1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

Heavy-duty ——— Light-duty ———
Medium-duty ——— Unimproved dirt - - - -
U. S. Route State Route

BEVERLY, KY.

LANDSLIDES AND RELATED FEATURES

OF THE BEVERLY, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (H-4)

field check 1980-1981

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P

OLD LANDSLIDE

Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V

COLLUVIAL SLOPE

Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

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Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol D designates historical debris flow or debris avalanche.

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Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

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AREAS LEAST PRONE TO LANDSLIDES

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Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

- sh bench with high wall
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- sd multiple furrows and multiple benches
- ss hilltop removed
- srg reclaimed by grading
- sru reclaimed by secondary use
- sh/r regraded in part, high wall remains

Coal refuse banks

- r identified on aerial photographs; not classified in field check
- rb not burnt nor on fire
- rbb burnt
- rbd burning
- rbs sludge

Quarries

- q quarry site
- qub spoil bank, quarry waste

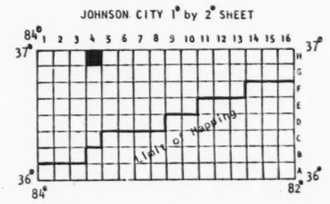
Gravel pits

- g site of gravel pit

Slides in man-made features

- af earth flow in fill
- a/s earth flow in strip castings
- a/r earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE HELTON, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

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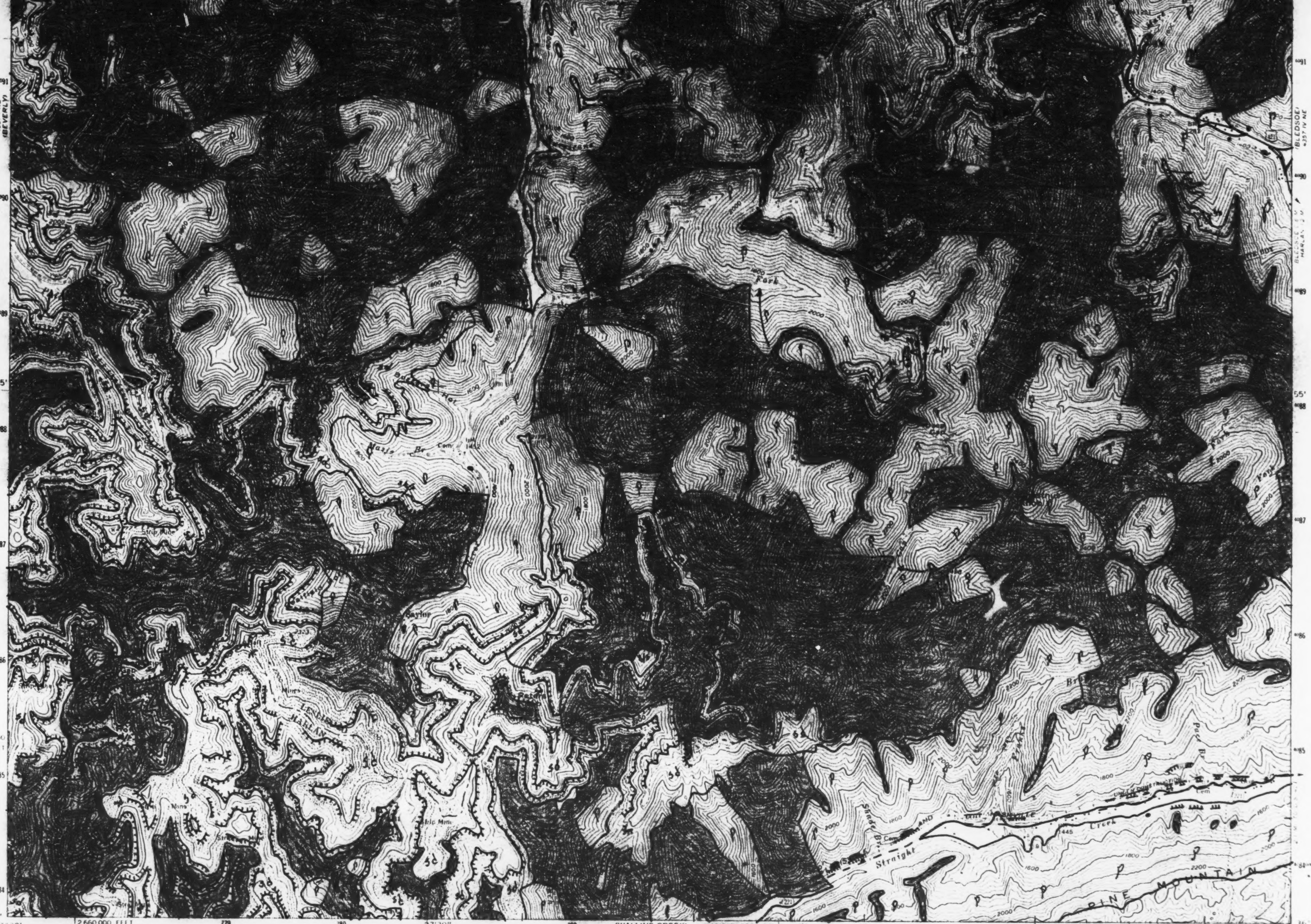

36°52'30" 83°30' 2 660 000 FEET 279 280 27'30" 282 (WALLINS CREEK) 4357 IV SW STONEY FORK 7 MI 284 25' 285 286 36°52'30" 83°22'30"

(BALKAN) 4257 I SE

Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1952. Field checked 1954. Revised from aerial photographs taken 1973. Field checked 1974

Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system, south zone
1000-metre Universal Transverse Mercator grid ticks.

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U. S. Route — State Route

(HARLAN)

KENTUCKY
QUADRANGLE LOCATION

HELTON, KY.
NW/4 HARLAN 15' QUADRANGLE
N3652.5—W8322.5/7.5

1974

Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE HELTON, KY. QUADRANGLE

by

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1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (H-5)

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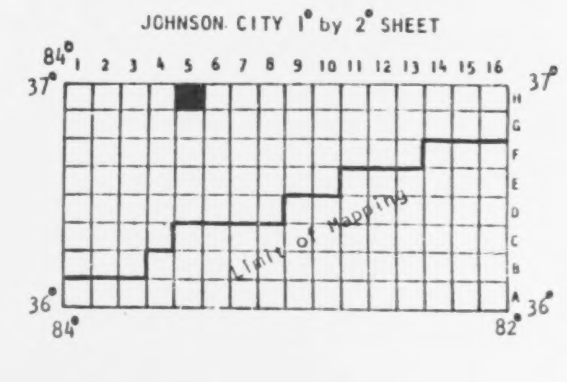
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
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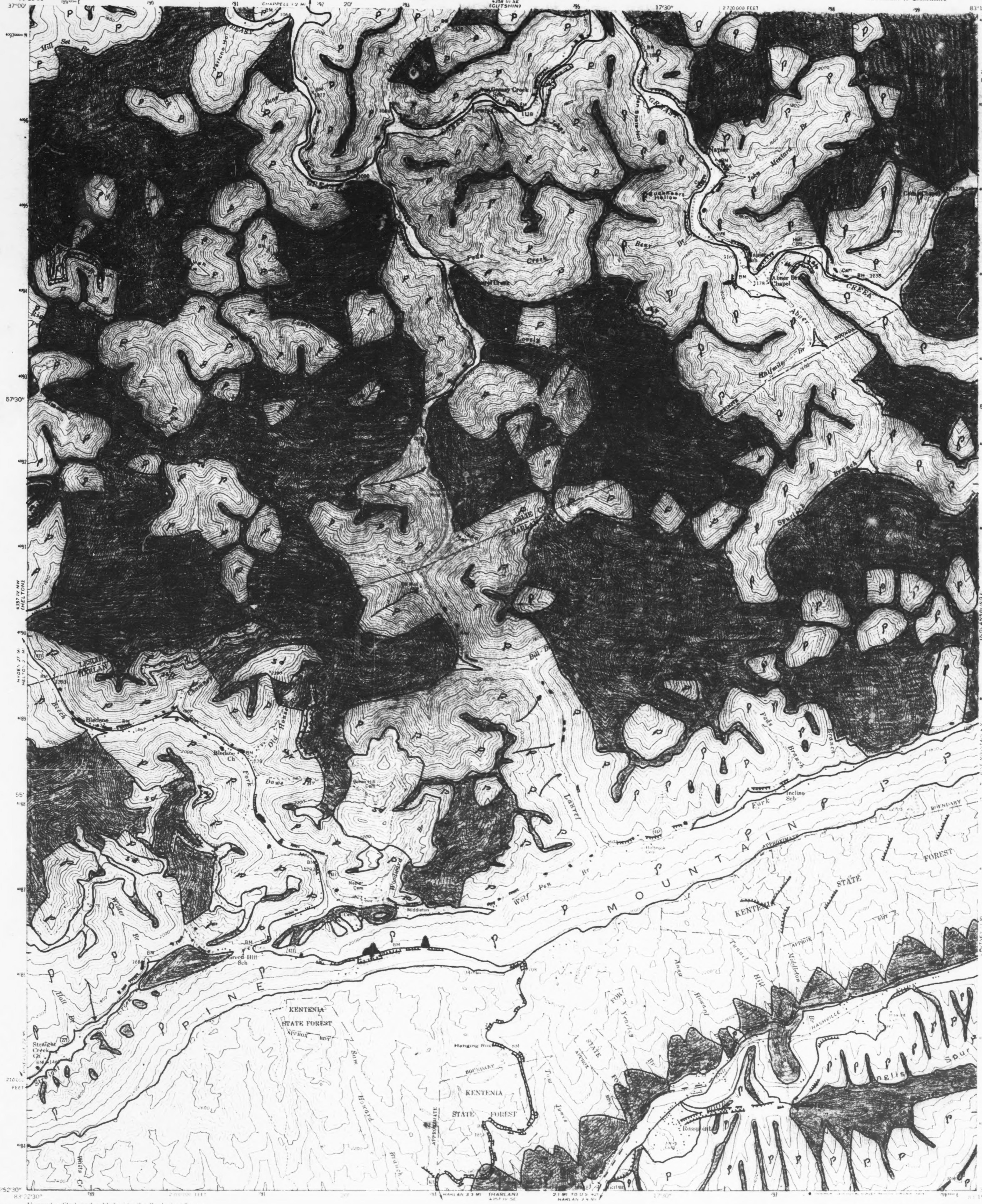
GEOLOGICAL SURVEY

STATE OF KENTUCKY
AGRICULTURAL AND INDUSTRIAL DEVELOPMENT BOARD

BLEDSOE QUADRANGLE
KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC)
NE/4 HARLAN 15' QUADRANGLE



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography from aerial photographs by multiplex methods
Aerial photographs taken 1951–1952. Field check 1954

Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system, south zone

1000-metre Universal Transverse Mercator grid ticks

UTM GRID AND 1954 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION

BLEDSOE, KY.
NE/4 HARLAN 15' QUADRANGLE

1954

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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Data on landslides and strip mines in part from Csejtey, Bela Jr., 1971, Geologic map of the Bledsoe quadrangle, southeastern Kentucky:

LANDSLIDES AND RELATED FEATURES

OF THE BLEDSOE, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

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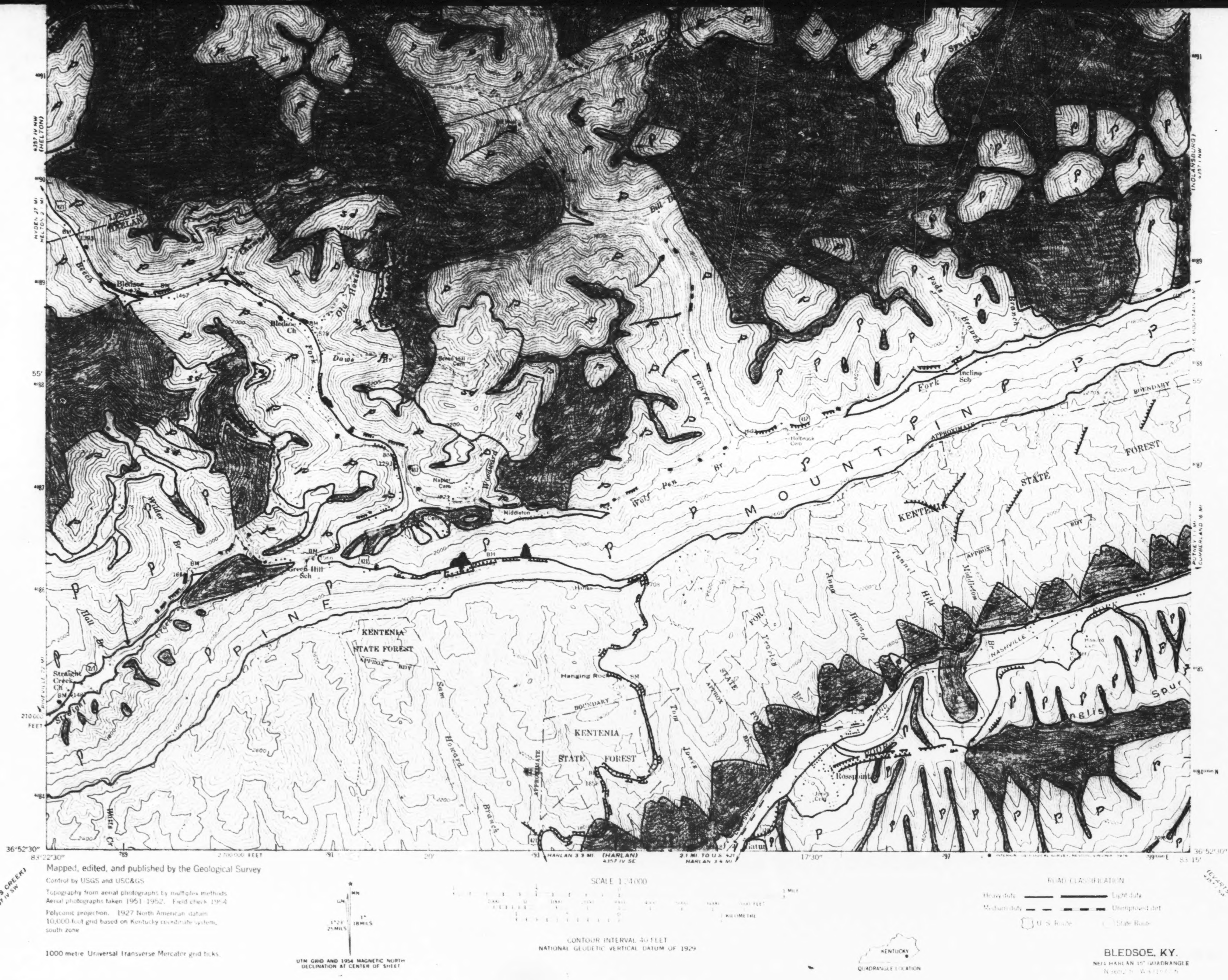

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1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Data on landslides and strip mines in part from Csejtey, Bela Jr., 1971, Geologic map of the Bledsoe quadrangle, southeastern Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-889, scale 1:24000.

LANDSLIDES AND RELATED FEATURES

OF THE BLEDSOE, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(H-6)

ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

P OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

↓ AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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NOTE

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

sh	bench with high wall
sf	furrowed with high wall
sd	multiple furrows and multiple benches
ss	hilltop removed
srg	reclaimed by grading
sru	reclaimed by secondary use
sh/r	regraded in part, high wall remains

Coal refuse banks

r	identified on aerial photographs; not classified in field check
rb	not burnt nor on fire
rbb	burnt
rbd	burning
rbs	sludge

Quarries

q	quarry site
qub	spoil bank, quarry waste

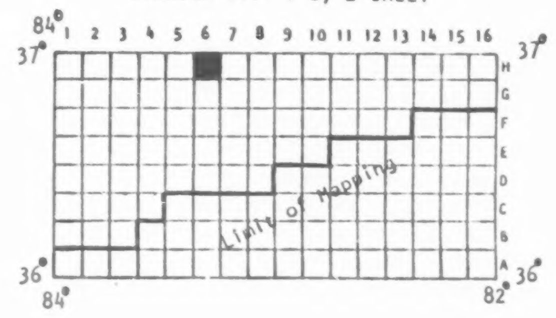
Gravel pits

g	site of gravel pit

Slides in man-made features

af	earth flow in fill
a/s	earth flow in strip castings
a/r	earth flow in coal refuse

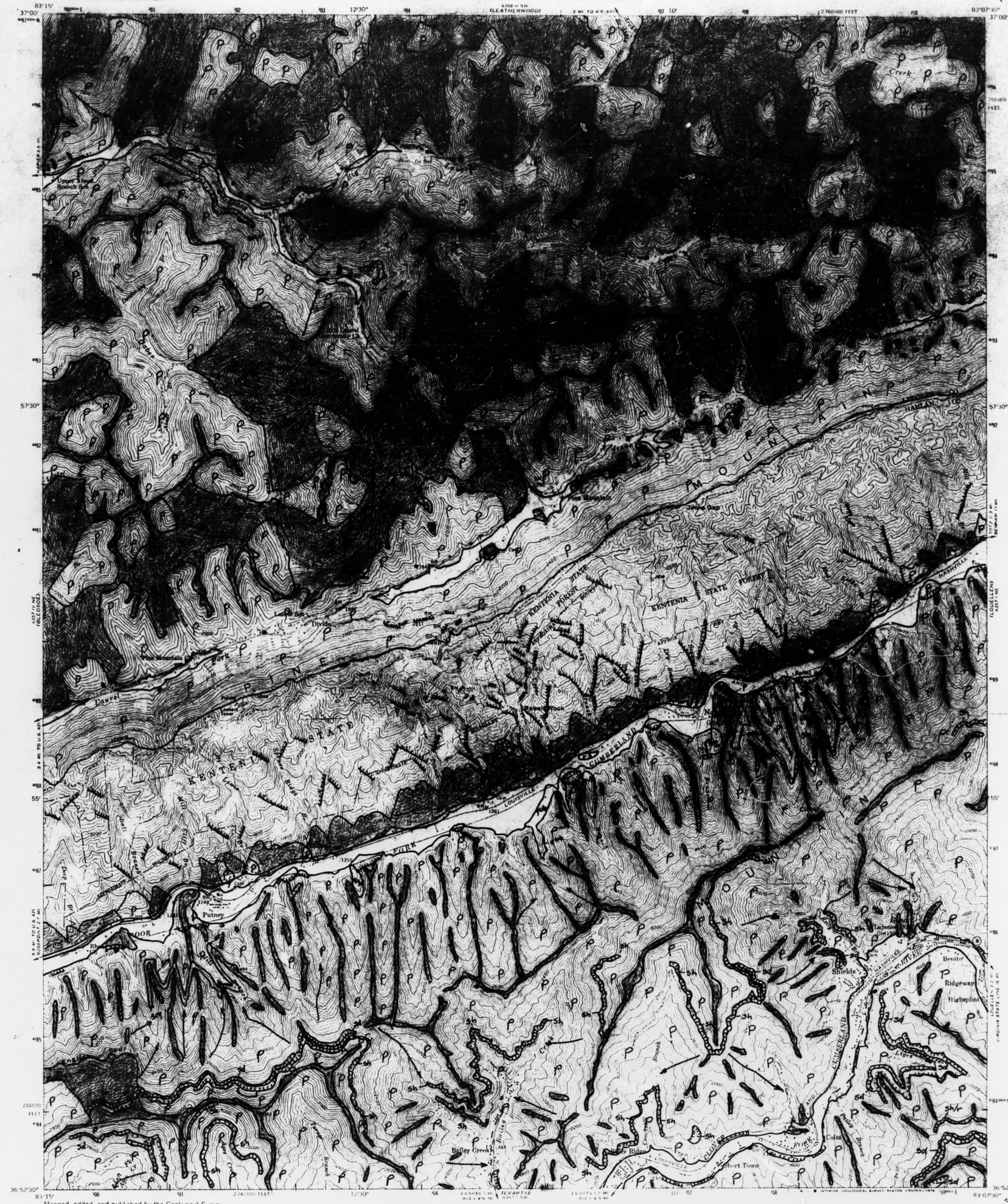
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
AGRICULTURAL AND INDUSTRIAL DEVELOPMENT BOARD

NOLANSBURG QUADRANGLE
KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography from aerial photographs by stereoplanigraph
Aerial photographs taken 1952 and 1953. Field check 1954

Polyconic projection. 1927 North American datum
10,000-foot grid based on Kentucky coordinate system, south zone

Contours in strip mine areas from 1952 and 1953 photography

1000-meter Universal Transverse Mercator grid ticks

There may be private inholdings within the boundaries of the National or State reservations shown on this map

SCALE 1:24000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Heavy duty — Light duty
Medium duty - - - Unimproved dirt .....
U.S. Route - State Route

NOLANSBURG, KY.

1954

Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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Data on landslides and strip mines in part from Csejtey, Bela Jr., 1970, Geologic map of the Nolansburg quadrangle, southeastern Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-868, scale 1:24000.

LANDSLIDES AND RELATED FEATURES

OF THE NOLANSBURG, KY. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(H-7)

NOTE

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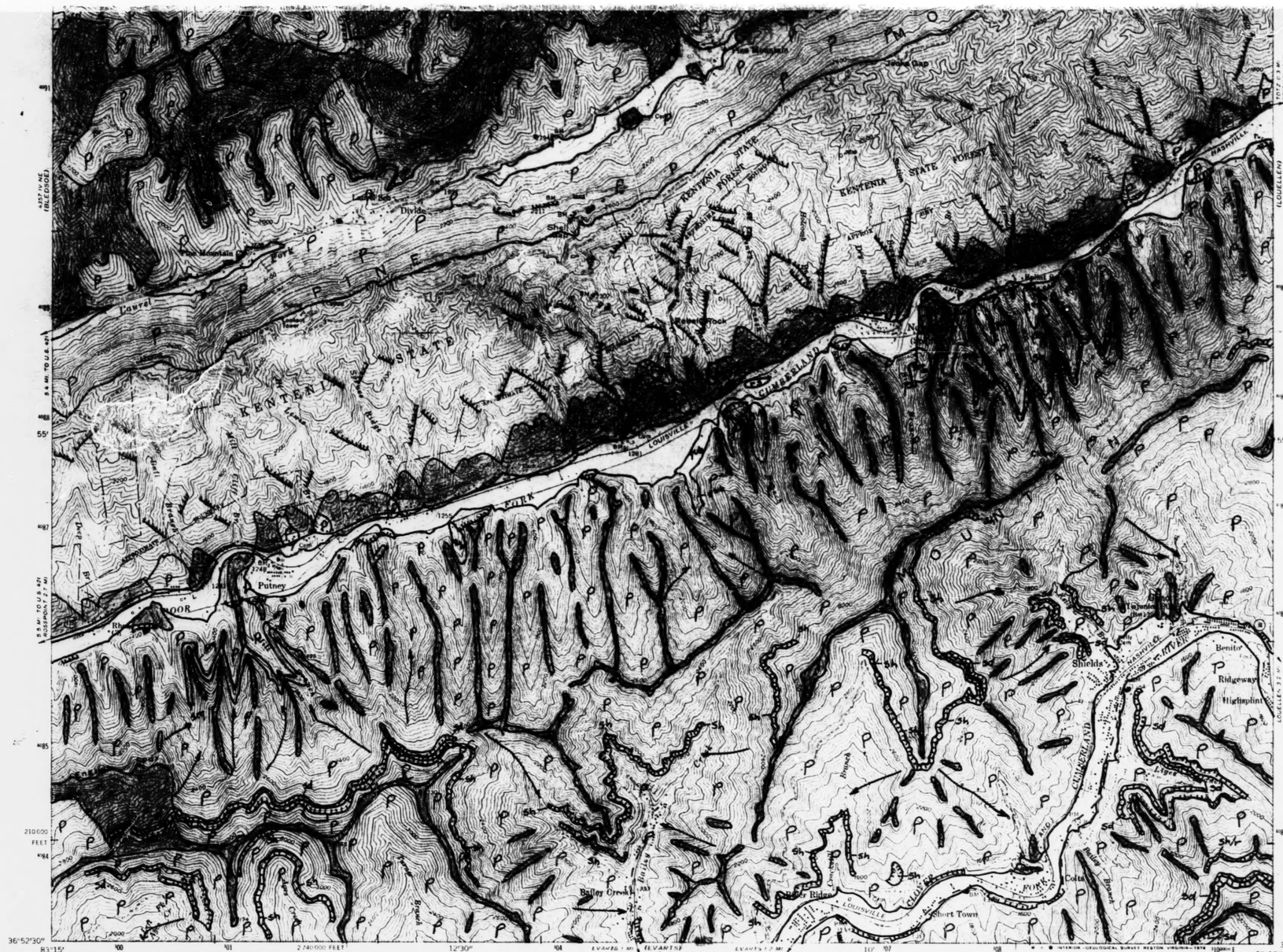
MAN-MADE FEATURES
Strip mines (combination of letter symbols



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography from aerial photographs by stereoplanigraph
Aerial photographs taken 1952 and 1953. Field check 1954

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SCALE 1:24000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1954 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION

Heavy duty — Light duty
Medium duty — Unimproved dirt
U.S. Route — State Route

KENTUCKY
QUADRANGLE LOCATION

NOLANSBURG, KY.

N3652.5—W8307.5/7.5

1954

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE NOLANSBURG, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(H-7)

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OLD LANDSLIDE
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COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol designates historical debris flow or debris avalanche.

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Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

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NOTE

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Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

- sh — bench with high wall
- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

Coal refuse banks

- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries

- q — quarry site
- qub — spoil bank, quarry waste

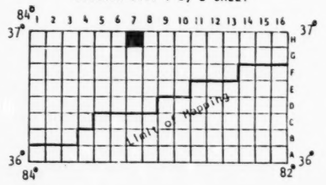
Gravel pits

- g — site of gravel pit

Slides in man-made features

- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
AGRICULTURAL AND INDUSTRIAL DEVELOPMENT BOARD

LOUELLEN QUADRANGLE
KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC)

LOUELLEN, KY.

1954

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Data on landslides and strip mines in part from Froelich, A.J., 1973, Geologic map of the Louellen quadrangle, southeastern Kentucky:

LANDSLIDES AND RELATED FEATURES

OF THE LOUELLEN, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

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Data on landslides and strip mines in part from Froelich, A.J., 1973, Geologic map of the Lowellen quadrangle, southeastern Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1060, scale 1:24000.

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Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

P

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V

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Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

LANDSLIDES AND RELATED FEATURES

OF THE LOUELLEN, KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (H-3)

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Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

Coal refuse banks

- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries

- q — quarry site
- qub — spoil bank, quarry waste

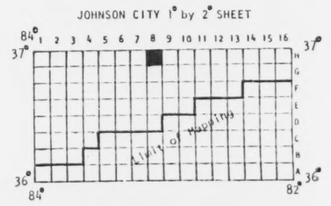
Gravel pits

- g — site of gravel pit

Slides in man-made features

- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF KENTUCKY
AGRICULTURAL AND INDUSTRIAL DEVELOPMENT BOARD

BENHAM QUADRANGLE
KENTUCKY - VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 BIG STONE GAP 15' QUADRANGLE

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography from aerial photographs by stereophotogrammetric methods. Aerial photographs taken 1952. Field check 1954

Polyconic projection. 1927 North American datum
10,000-foot grids based on Kentucky coordinate system, south zone, and Virginia coordinate system, south zone

Red tint indicates areas in which only landmark buildings are shown

Contours in strip mine areas compiled from 1952 photography

1000-meter Universal Transverse Mercator grid ticks,

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
U.S. Route — State Route

KENTUCKY
QUADRANGLE LOCATION

BENHAM, KY.—VA.
NW/4 BIG STONE GAP 15' QUADRANGLE
N 3652.5 - W 8252.5/7.5
1954

Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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Data on landslides and strip mines in part from Froelich, A.J., and Stone, B., 1973, Geologic Map of parts of the Benham and Appalachia quadrangles,

LANDSLIDES AND RELATED FEATURES

OF THE BENHAM, KY.-VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

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Data on landslides and strip mines in part from Froelich, A.J., and Stone, B., 1973, Geologic Map of parts of the Benham and Appalachia quadrangles, Harlan and Letcher Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1059, scale 1:24000.

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OF THE BENHAM, KY.-VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(H-9)

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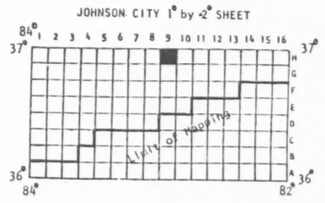

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

APPALACHIA QUADRANGLE
VIRGINIA–KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC) 178-NE

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS/NOAA, USGS and TVA

Topography by photogrammetric methods using aerial photographs taken 1953. Field examination by TVA 1955

Polyconic projection. 1927 North American datum
10,000 foot grid based on Virginia (South) and Kentucky (South) rectangular coordinate systems
1000 meter Universal Transverse Mercator Grid ticks

UTM GRID AND 1977 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy duty — Poor motor road
Medium duty — Wagon and jeep track
Light duty — Foot trail
U. S. Route — State Route

In developed areas, only through roads are classified

APPALACHIA, VA.-KY.

1955

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Data on landslides and strip mines in part from Froelich, A.J., and Stone, B., 1973, Geologic Map

LANDSLIDES AND RELATED FEATURES

OF THE APPALACHIA, VA.-KY. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

NOTE

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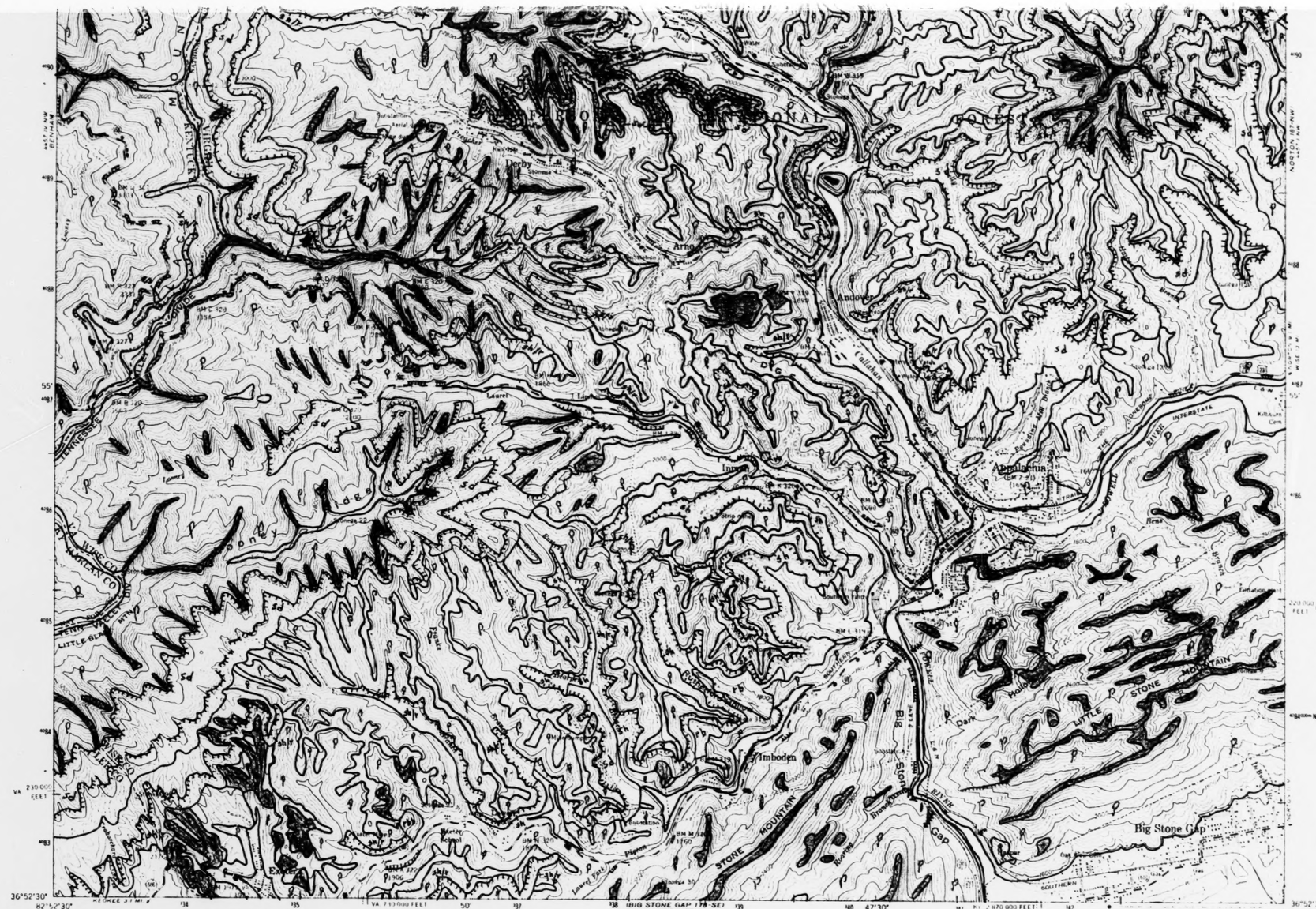
Arno
Derby
Laurel
Imboden
Andover
Appalachia
Big Stone Gap
Exeter
STONE MOUNTAIN
LITTLE STONE MOUNTAIN
Big Stone
Gap
Powell
Mountain
Wise Co.
Lee Co.
Russell Co.
Tennessee
Virginia
Kentucky
Interstate
Southern
Railway
Pocket
Dam
Reservoir
Cumberland
Gap
National
Forest
Callahan
Creek
Stone
Fork
Little
Stone
Mountain
Big
Stone
Gap
Exeter
Laurel
Imboden
Arno
Derby
Andover
Appalachia
Big Stone

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

NORTON QUADRANGLE
VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC) 167-NW

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS/NOAA, USGS, and TVA

Topography by photogrammetric methods from aerial photographs taken 1953. Map field checked by TVA, 1957

Polyconic projection. 1927 North American datum
10,000 foot grid based on Virginia (South) rectangular coordinate system

1000 meter Universal Transverse Mercator Grid ticks

SCALE 1:24 000

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 KILOMETER

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy duty — Pave motor road
Medium duty — Wagon and jeep track
Light duty — Foot trail
Route — State Route

In developed areas, only through roads are classified

NORTON, VA.
N3800-W8215/7.5

1957

Landslides and related features interpreted from aerial photographs:
1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE NORTON, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (H-11)

NOTE

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Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS/NOAA, USGS, and TVA

Topography by photogrammetric methods using aerial photographs taken 1953. Map field checked by TVA, 1957

Polyconic projection. 1927 North American datum
10,000 foot grid based on Virginia (South) rectangular coordinate system

1000 meter Universal Transverse Mercator Grid ticks

SCALE 1:24 000

1 MILE
0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1976 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy duty	Poor motor road
Medium duty	Wagon and jeep track
Light duty	Foot trail

13 U. S. Route ○ State Route

In developed areas, only through roads are classified

NORTON, VA.

N3652.5-W82 37.5/7.5

1957

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE NORTON, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(H-11)

ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

The first six digits of the open file number designate the specific 1:250,000 scale map sheet of which this quadrangle is a part. The last two digits designate the position of the quadrangle in a subdivision of the 1:250,000 scale map based on rows and tiers shown in the diagram to the right. The location of this quadrangle is shown by the black square.

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

sh	bench with high wall
sf	furrowed with high wall
sd	multiple furrows and multiple benches
ss	hilltop removed
srg	reclaimed by grading
sru	reclaimed by secondary use
sh/r	regraded in part, high wall remains

Coal refuse banks

r	identified on aerial photographs; not classified in field check
rb	not burnt nor on fire
rbb	burnt
rbd	burning
rbs	sludge

Quarries

q	quarry site
qub	spoil bank, quarry waste

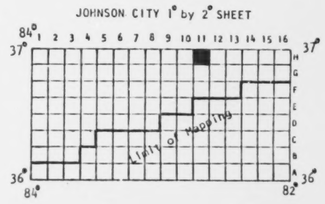
Gravel pits

g	site of gravel pit

Slides in man-made features

af	earth flow in fill
a/s	earth flow in strip castings
a/r	earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE WISE, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (H-12)

NOTE

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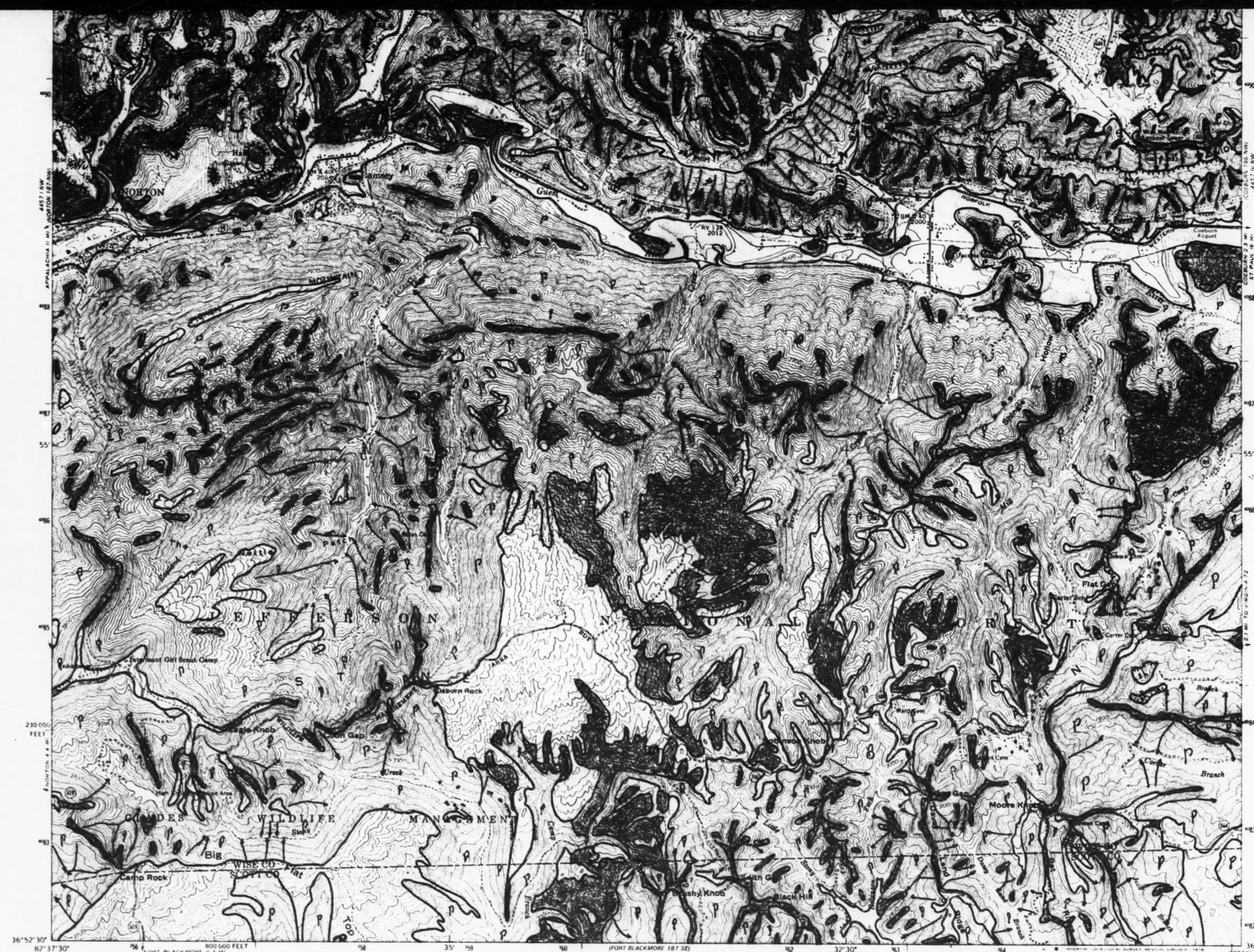
MAN-MADE FEATURES

Strip mines (combination of letter symbols



Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS/NOAA, USGS, and TVA

Topography by photogrammetric methods from aerial photographs taken 1953. Map field checked by TVA, 1957

Polyconic projection. 1927 North American datum
10,000 foot grid based on Virginia (South) rectangular coordinate system
1000 meter Universal Transverse Mercator grid ticks

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1957 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy duty — Light duty — Medium duty — Fair trail — Poor motor road — Wagon and jeep track

U.S. Route — State Route

In developed areas, only through roads are classified

WISE, VA.
N3652.5-W8230/7.5
1957

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE WISE, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (H-12)

ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified from historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

P — OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V — COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)
- sh — bench with high wall
- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

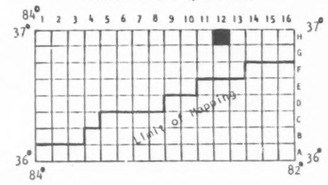
Coal refuse banks
- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries
- q — quarry site
- qub — spoil bank, quarry waste

Gravel pits
- g — site of gravel pit

Slides in man-made features
- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

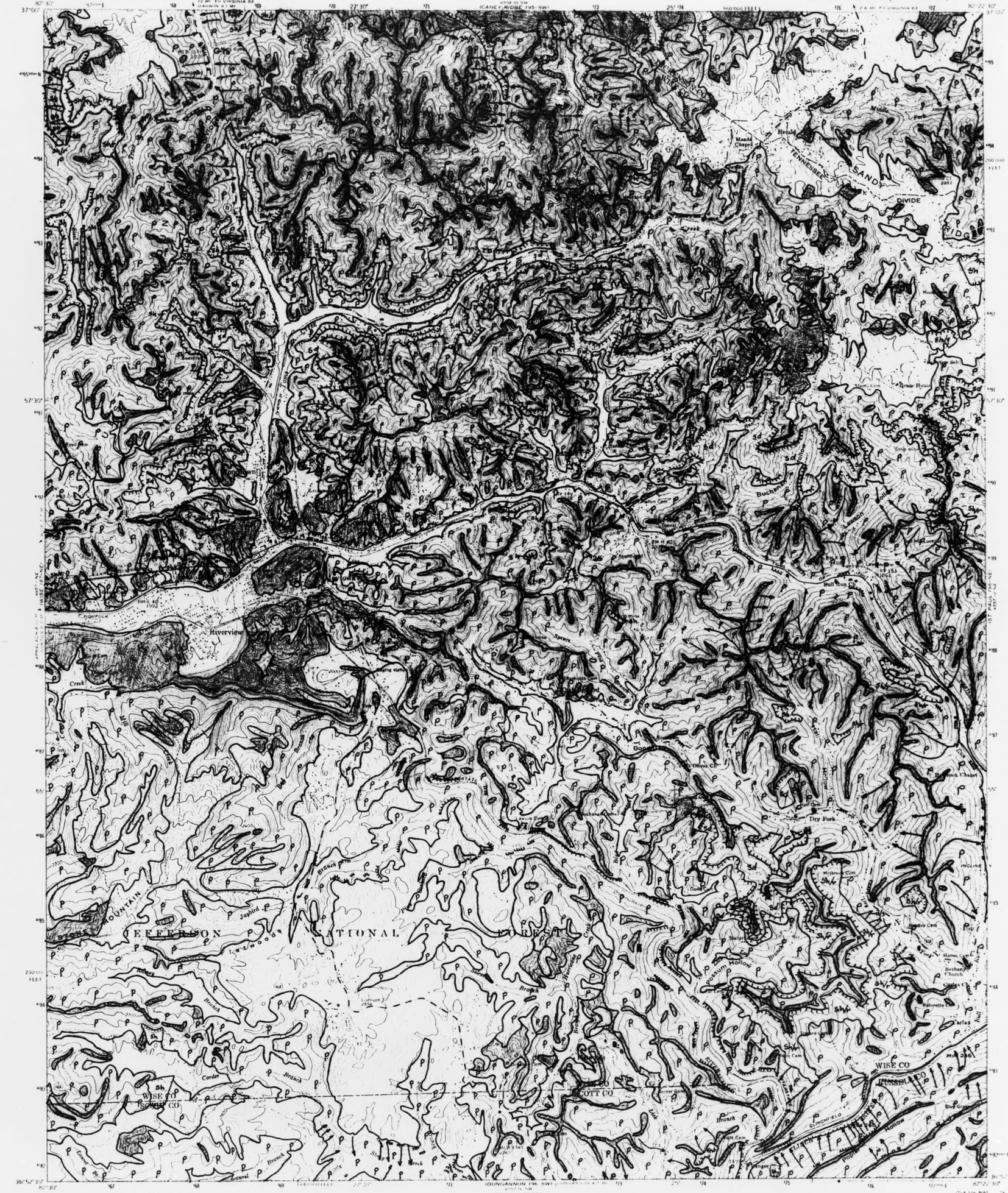
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

COEBURN QUADRANGLE
VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC) 196-NW



Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS, NOAA, USGS, and TVA

Topography by photogrammetric methods from aerial photographs taken 1955. Map field checked by TVA 1957

Polyconic projection. 1927 North American datum
10,000-foot grid based on Virginia coordinate system
1000 meter Universal Transverse Mercator grid ticks

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1978 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION

Heavy duty — Light duty — Medium duty — Unimproved dirt — U.S. Route — State Route

COEBURN, VA.

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE COEBURN, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (H-13)

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

ACTIVE OR RECENTLY ACTIVE LANDSLIDE

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Published by the Geological Survey

Control by NOS, NOAA, USGS, and TVA

Topography by photogrammetric methods using aerial photographs taken 1953. Map field checked by TVA 1957

Polyconic projection. 1927 North American datum
10,000-foot grid based on Virginia (South) rectangular coordinate system
1000-meter Universal Transverse Mercator grid ticks

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy duty — Poor motor road
Medium duty — Wagon and jeep track
Light duty — Foot trail
U.S. Route — State Route
In developed areas, only through roads are classified

COEBURN, VA.

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE COEBURN, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (H-13)

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MAN-MADE FEATURES
Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)

- sh — bench with high wall
- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

Coal refuse banks

- r — identified on aerial photographs; not classified in field check
- rb — not burnt nor on fire
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries

- q — quarry site
- qub — spoil bank, quarry waste

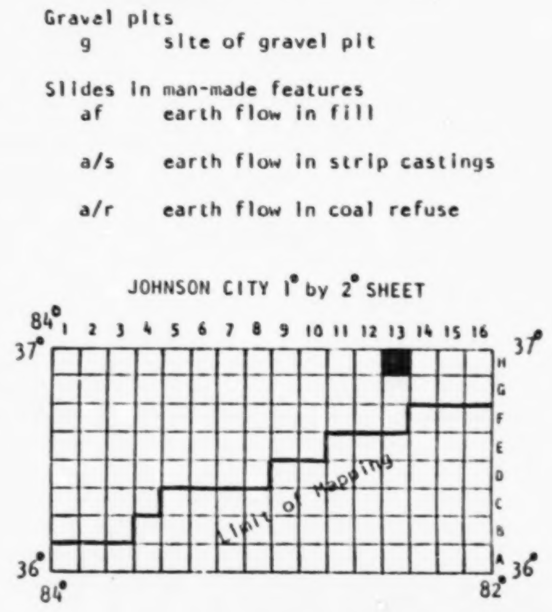
Gravel pits

- g — site of gravel pit

Slides in man-made features

- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

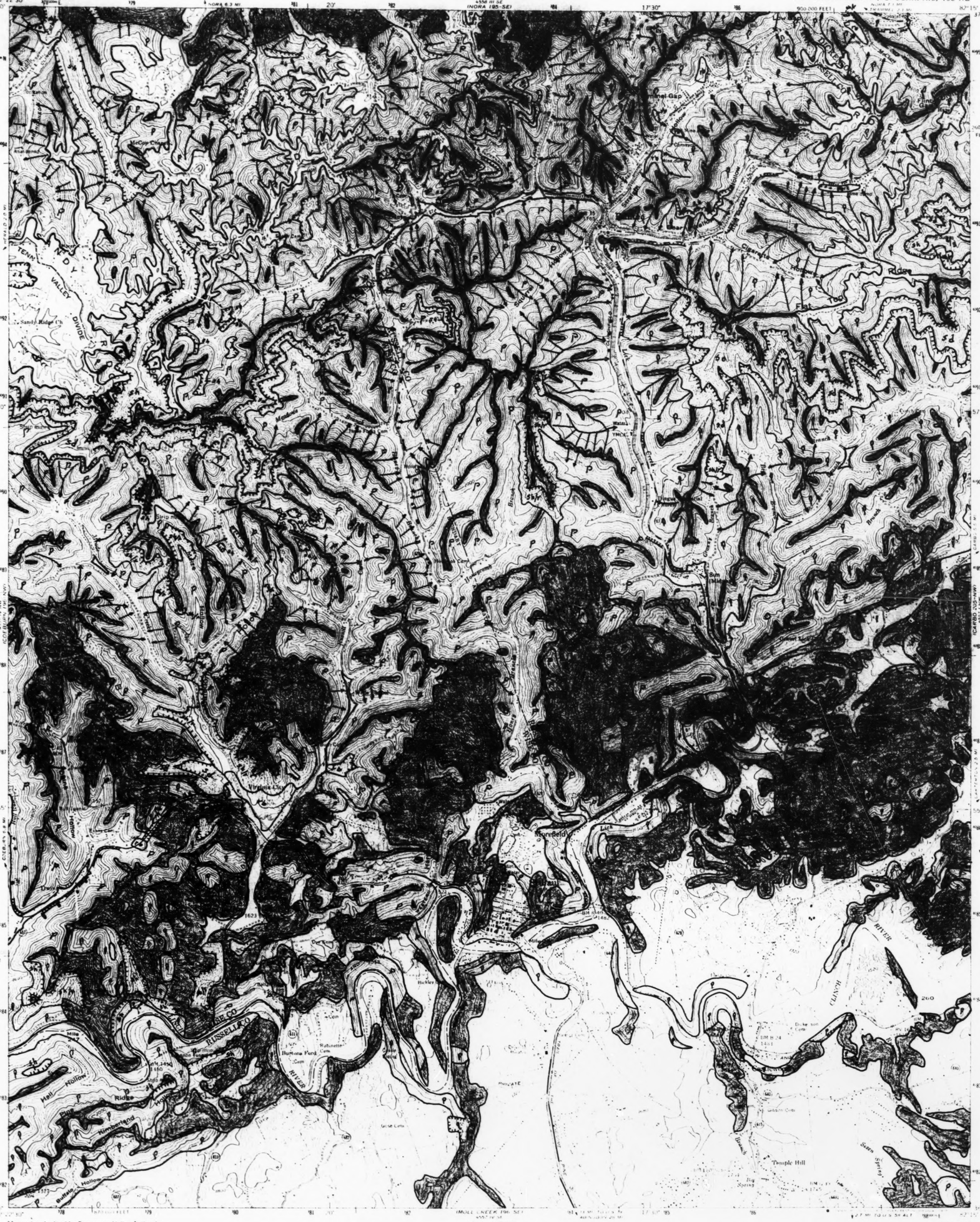
JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

ST. PAUL QUADRANGLE
VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC) 196-NE



Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS/NOAA, USGS, and TVA

Topography by photogrammetric methods using aerial photographs taken 1948b and 1953. Map field checked by TVA, 1958

Polyconic projection. 1927 North American datum
10,000 foot grid based on Virginia (south) rectangular coordinate system

1000-meter Universal Transverse Mercator Grid ticks

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
DASHED CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Heavy duty — Four-lane road
Medium duty — Winding and poorly marked
Light duty — Trail
U.S. Route ○ State Route

ST. PAUL, VA.

1958

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE ST. PAUL, VA. QUADRANGLE

by
William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (M-1h)

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Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS/NOAA, USGS, and TVA

Topography by photogrammetric methods using aerial photographs taken 1946 and 1953. Map field checked by TVA, 1958

Polyconic projection. 1927 North American datum
10,000 foot grid based on Virginia (South)
rectangular coordinate system

1,000 meter Universal Transverse Mercator Grid ticks

SCALE 1:24 000

1 MILE

CONTOUR INTERVAL 40 FEET
DASHED LINES REPRESENT HALF-INTERVAL CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy duty — Poor motor road
Medium duty — Wagon and jeep track
Light duty — Foot trail
U.S. Route — State Route

In developed areas, only through roads are classified.

ST. PAUL, VA.

1958

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

LANDSLIDES AND RELATED FEATURES

OF THE ST. PAUL, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422 (H-14)

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P — OLD LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwise documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

V — COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; slide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines and chutes designated show evidence of former debris flows and avalanches. Symbol ▲ designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or more high; formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding. Includes coves (U-shaped, shallow valleys) containing thick layers of clayey soil that are very susceptible to sliding where excavation breaks continuity of slope and where overloaded by artificial fill.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

The first six digits of the open file number designate the specific 1:250,000 scale map sheet of which this quadrangle is a part. The last two digits designate the position of the quadrangle in a subdivision of the 1:250,000 scale map based on rows and tiers shown in the diagram to the right. The location of this quadrangle is shown by the black square.

NOTE

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MAN-MADE FEATURES

Strip mines (combination of letter symbols indicates complex formed of more than one type of strip mine)
- sh — bench with high wall
- sf — furrowed with high wall
- sd — multiple furrows and multiple benches
- ss — hilltop removed
- srg — reclaimed by grading
- sru — reclaimed by secondary use
- sh/r — regraded in part, high wall remains

Coal refuse banks
- r — identified on aerial photographs; not classified in field check
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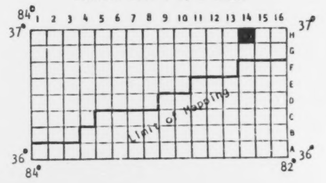
- rbb — burnt
- rbd — burning
- rbs — sludge

Quarries
- q — quarry site
- qub — spoil bank, quarry waste

Gravel pits
- g — site of gravel pit

Slides in man-made features
- af — earth flow in fill
- a/s — earth flow in strip castings
- a/r — earth flow in coal refuse

JOHNSON CITY 1° by 2° SHEET



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPPING SERVICES BRANCH

CARBO QUADRANGLE
VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC) 205-NW

Mapped and edited by Tennessee Valley Authority
Published by the Geological Survey

Control by NOS/NOAA, USGS, and TVA

Topography by photogrammetric methods from aerial photographs taken 1946. Map field checked by TVA, 1948

Polyconic projection. 1927 North American datum
10,000-foot grid based on Virginia coordinate system
1000-meter Universal Transverse Mercator grid ticks

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET

ROAD CLASSIFICATION

Heavy duty — Medium duty — Light duty — Poor motor road — Wagon and jeep trail — Foot trail — U.S. Route — State Route

In developed areas, only through roads are classified

CARBO, VA.
N3652.5—8207.5/7.5

Landslides and related features interpreted from aerial photographs:

1:80,000 black and white 1976

Photointerpretation and field check 1980-1981

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LANDSLIDES AND RELATED FEATURES

OF THE CARBO, VA. QUADRANGLE

by

William F. Outerbridge

1982

U.S. Geological Survey

OPEN FILE MAP 82-0422(H-15)

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Topography by photogrammetric methods using aerial photographs taken 1946. Map field checked by TVA 1958

Polyconic projection. 1927 North American datum
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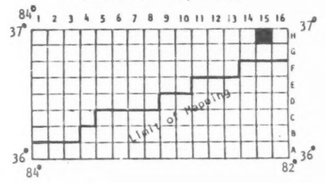

UNITED STATES
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OF THE LEBANON, VA. QUADRANGLE

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OPEN FILE **MAP 82-0422 (H-16)**

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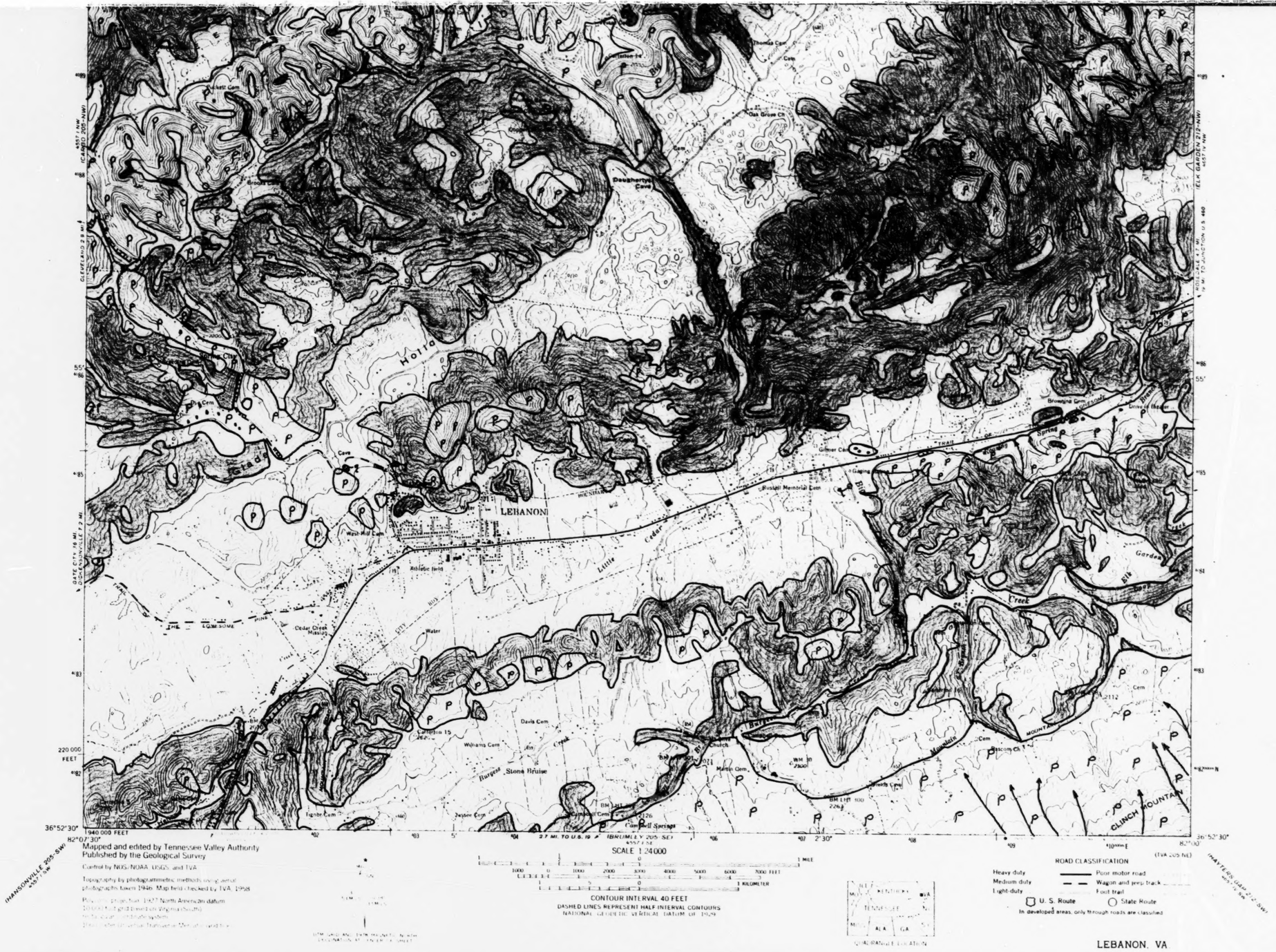

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Vertical datum is Mean Sea Level

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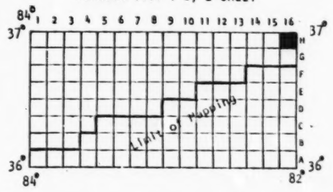
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